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A field experiment into the usage of coaching and mentoring interventions, in the tech sector asynchronous e-learning contexts, to achieve better learner outcomes

by
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DECLARATION

I hereby declare that this PhD dissertation is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used to write this dissertation.

This PhD dissertation has not also been submitted for any degree in any University previously.

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ABSTRACT

Micro-coaching as a blend to make e-learning more effective

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While e-learning has taken a stronghold as the de-facto training medium in knowledge intensive technology sector organizations, several factors have been hypothesized to influence the efficacy of training efforts, such as educator presence, interaction levels and individual motivation for development. This dissertation looks at one blended learning intervention that organizations can make use of to significantly improve the learning outcomes. The paper introduces micro-coaching, a new construct referring to brief coaching and mentoring interventions, that in conjunction with the e-learning sessions can improve cognitive as well as behavioral changes in individuals, which are key to improving learning and the resultant business performance.

Initial insights for this dissertation were developed through a grounded theory research approach looking into the barriers to workplace blended learning adoption, inefficacies therein and how coaching interaction as a blend can help improve both the cognitive and behavioral aspects of such training. The importance and substantive validity of this issue was first explored and confirmed through a series of semi-structured interviews with six practitioners in the field that have

responsibility for and experience with traditional face-to-face, on-line and blended delivery models in large international organizations.

A field experiment was then conducted to test e-learning outcomes controlled for coaching and mentoring interventions. The results demonstrate support for the hypothesis that even minimalist coaching and mentoring interventions will not only improve cognition but also enhance retention, and the participant's motivation to learn further. The results are linked to on the job performance behavior.

This dissertation contributes to the growing practice of workplace e-learning, blended learning and coaching by drawing attention to benefits of integration of training methods across the organization and suggests directions for further research. The practical results of the dissertation contribute to management theory by providing an effective option for organizations to convert line managers and internal subject matter experts into micro-coaches and improve e-learning effectiveness.

Keywords: E-learning, blended learning, learning outcome, effectiveness, coaching, mentoring, workplace learning, learning and development, corporate training.

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DEDICATION

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1. Introduction

1.1. Background

In the world of rapid technological advances, changing business models and fierce competition that we live in, organizations are evermore dependent on knowledge management and lifelong learning as key drivers of organizational success (Marsick & Watkins, 2015). While this is most evident in the technology sector, in recent times technology has become all pervasive and none of the industry sectors are spared of the need to continuously acquire new knowledge. In such a knowledge intensive world where finding people with new order skills in the job market is impossible and there is an ever-increasing demand for employee productivity and innovation, training employees to acquire a variety of job-related knowledge, skills, competencies, and behaviour is a necessity (Jacobs, 2017). To address this need within the context of changing employee demographics, a global and multicultural workforce and demand for anywhere, anytime learning models, organizations have shifted to online learning or e-learning as a de-facto training medium to delivering learning (Clark & Mayer, 2016).

E-learning is referred to varyingly as a learning environment, a training technique or training method, an instructional strategy or an instructional medium encompassing such things as computer based learning, virtual classrooms and discussion boards and online collaboration (DeRouin, Fritzsche & Salas, 2005a; Klein, Noe & Wang, 2006; Tynjälä & Häkkinen, 2005; Cheng, Wang, Mørch, Chen & Spector, 2014). In this mode of learning at the workplace, learners are not subject

to time-bound face-to-face classroom instructions but rather access all learning and interactions online in an asynchronous manner, at their own pace. Features such as synchronous learning that are present in the academic online courses and collaborative learning are limited or absent within work contexts due to this preference for flexible timing and individualized nature of learning.

As of the end of 2017, the global workplace training market was already at USD 362.2 billion (Statista, 2018) and expected to grow at a CAGR of near 10% from 2018-2022, with e-learning training modules being a major contributor (Technavio, 2018). A key factor driving this growth of e-learning is the cost-effectiveness and convenience factors (Wang, 2018) and a large body of knowledge supporting e-learning to be equal if not more effective than face-to-face classroom learning (Bernard, Borokhovski, Schmid, Tamim & Abrami, 2014). Recent improvement in technologies have helped add a variety of instruction methods and techniques to e-learning. Thus, it can now incorporate most of the known corporate training methods (Martin, Kolomitro & Lam, 2014) viz., lecture, programmed instruction, case study, games-based training, role play, simulation, role-modelling, and stimulus-based training. Only the physical immersion and intervention models such as mentoring and apprenticeship, internship, job rotation and job shadowing, and team-training are not yet in the e-learning mode of delivery.

1.2. The challenge

Modern-day organizations understand the need for continuous learning and constant reskilling of employees to improve productivity and maintaining superiority in the marketplace (Arthur, Bennett, Edens & Bell, 2003). For workplace e-learning to deliver this successfully, it should help (a) integrate conceptual knowledge and practical experience to help create expertise, (b) enable informal learning, (c) convert tacit knowledge to explicit knowledge by encouraging sharing, (d) provide structured learning support and guidance, and (e) offer face-to-face learning situations to help resolve conflicts and sustain further learning (Tynjälä & Häkkinen, 2005).

However, despite all the technological sophistications noted earlier, e-learning can only partially address the above requirements. Firstly, uptake and utilization of even the best designed e-learnings are affected by the reality of the internal and external work environment, and the time pressures and multi-tasking nature of today's jobs within the organizations. Further, factors such as availability of learning resources and environmental support, interaction and practice, individual experience and motivation also affect the effectiveness measures of (a) learning outcomes namely, retention and behaviour, and (b) transfer of knowledge to practice (Noesgaard, Ørngreen & Foundation, 2015). The typical delivery approach of e-learning potentially introduces further inefficacies through the absence of a community of inquiry due to on-demand learning, lack of

monitorization of usage, lack of structured guidance, and a number of individual or organizational level factors (Rentroia-Bonito, Gonçalves & Jorge, 2015).

The heightened research activity in to e-learning effectiveness is evidence that there are challenges here. In a recent study covering the last 6 years of online courses by large universities such as MIT and Harvard, Reich and Ruiperez-Valiente (2019) reported high dropout rates where most students did not even enter into the courseware after enrolment. Further, completion rates have also been continuously declining even amongst students who have signed up for paid (certified) courses. With learning providers turning to new technologies such as artificial intelligence and virtual reality for a solution, the authors observe that new technologies cannot fully replace existing processes and systems and that educators have to first think of ways to supporting learners to completing the courses and benefiting from the time and financial investments.

With most e-learning designs continuing to be predominantly one-size-fits-all affairs (Rentroia-Bonito et al., 2015), management confidence is still low when it comes to skills from such learnings being put to use in real work conditions (Bright & Crockett, 2012). From my recent conversations with a sampling of the leaders in the tech-sector it is obvious that most organizations are still having to resort to traditional methods to impart knowledge at the ‘application’, ‘analysis’ and ‘synthesis’ levels of cognition (Bloom, 1956) despite investing in advanced e-learnings and expecting much better results.

1.3. The opportunity

1.3.1. Blended Learning Models

Blended learning, which combines face-to-face learning with e-learning, to help both personally construct and collaboratively confirm knowledge (Garrison, 2016) has emerged in the last decade-and-a-half and has been touted to address the effectiveness challenges (Renner, Laumer & Weitzel, 2015). This does offer an option to provide additional support, which will get the learners to not only sign-up and complete but also get the full return on time and effort invested.

While some organizations do have informal support structures such as tech-support-workgroups that could help learners, these are not set within the context of online learning and therefore are not being leveraged effectively by most learners. Further, with the sheer amount of learnings required forcing most employers to resort to bulk e-learning, implementation of such blended learning in workplace contexts are deemed costly and defeating the purpose of the self-paced e-learning model itself.

Extant research from academia and practice on e-learning success, to date, has focused on a variety of aspects: definitions and designs of the blended learnings (McGee & Reis, 2012); challenges with respect to improving flexibility, adding interaction, facilitating and fostering the learning processes (Boelens, De Wever & Voet, 2017); learning styles and cultural differences (Renner et al., 2015);

individualized scaffolding to help make transfer of learning meaningful and sustainable (Noesgaard, 2016); support for self-regulation (Van Laer & Elen, 2017) and individual differences such as personality, familiarity, self-motivation and personal commitment (Bright & Crockett, 2012; Gunawardena, Linder-VanBerschot, LaPointe & Rao, 2010); on social impact and organizational contexts (Cheng, Wang, Moormann, Olaniran, & Chen, 2012); on how to make the instructional technologies better (DeRouin, Fritzsche & Salas, 2004; Tynjälä & Häkkinen, 2005); on how to design and better structure e-learnings (Rentroia-Bonito et al., 2015) and so forth.

Thematic analysis of the demographic, methodological and topical trends in blended learning research to date (Drysdale, Graham, Spring & Halverson, 2013; Halverson, Graham, Spring, Drysdale & Henrie, 2014) have also pointed to a few additional gaps. Most research has been in the higher education context, probably due to a lack of access to corporate resources or that findings in the corporate contexts are being put forth mostly in non-academic publications (Halverson, Graham, Spring & Drysdale, 2012). When investigating blended learning, blend types have been mostly on combining face-to-face instructions with online resources and discussion with the interaction models focused on learner-to-instructor, general interaction, learner-to-learner, collaboration, community, and social presence. Further, most studies have focused on learner outcomes measured by test scores with lesser emphasis on aspects such as application of material in novel situations, satisfaction, and motivation to continue learning.

Finally, and most importantly, studies have focused on comparing the training formats (Nortvig, Petersen, & Balle, 2018) without providing enough clarity on whether a blended mode is successful or what makes this mode successful (Van Laer & Elen, 2017) and especially so in work contexts where the cost and convenience aspects are paramount. Analysing all the most cited articles, books, and authors on blended learning, Halverson et al. (2012) observed that most works have not only been non-empirical but have also been focusing on definitions, models and potential benefits, which is very much indicative of an early stage research field, and called for researchers to go beyond this stage.

With this backdrop, and with quantitative studies, which are deemed authentic and authoritative in any area, being few, I was motivated to undertake research aimed at identifying a blended model that could make e-learning in workplace contexts more effective without compromising the benefits of low cost and greater convenience. With continued reliance and further investments going into e-learning, the practitioners, as was evident from my interactions with some of the leaders, also have a keen desire to finding ways to improve learning outcomes and training transfer.

Back in 2004, Bonk and Kim, suggested coaching or mentoring as one of the predicted trends in future blended learning. McGee and Reis (2012) in their synthesis of best practices in blended learning, identified coaching and mentoring

as a form of face-to-face interaction with e-learning. Serrat (2017) also suggested having a knowledgeable person i.e., a coach or mentor, who continually engages a learner could be one of the social aspects that will make e-learning come alive and therefore improve effectiveness. However, this activity is still not prevalent, and rigorous studies of such integration and its impact are limited, particularly so in the corporate learning contexts.

1.3.2. Coaching as an effective blended model

Coaching, as a practice, has grown in the last two decades and today organizations widely employ coaching and mentoring to enhance performance and development (Theeboom, Beersma & van Vianen, 2014) and with this coaching research has also increased. Bright and Crockett (2012) found that coaching after training, even as a one time experience, is an effective learning transfer process that can be utilized more broadly across organizations. Universities have used coaching to help students set goals for their education and learn course content efficiently (Robinson & Gahagan, 2010) and used continuous coaching and feedback to induce higher-order thinking (Stein et al., 2013). Akyol & Garrison (2011) also suggested coaching and feedback helps with the knowledge of inquiry process within the learners, which in turn helps them ask questions to confirm their understanding, and improve learning among other metacognitive activities.

Extant literature has confirmed that coaching aids in the individual goals for improvement and therefore compatible with other forms of learning, training, and

development that also aim to improve individual performance with a view to resulting in eventual organizational performance (Jones, Woods & Guillaume, 2016). In their article on learning in the twenty-first century workplace, Noe, Clarke & Klein (2014) have observed that while people who possess higher self-efficacy and experience higher loci of control can persevere in blended learning, coaching may be required for others who get off the track. They also suggested mentoring as an effective aid for informal and personal learning in organizations. It should be noted here that the development of a favourable or unfavourable attitude towards learning, which is the affective aspect of Bloom's learning construct, will also drive an individual towards continuing to acquire and refine knowledge and therefore increase the individual's motivation to learn further. Wang (2018) studying the impacts of social learning support on e-learning performance, observed that learning intervention designs that incorporate peer mentoring, performance-oriented peer discussion, coaching, and collaboration activities have a positive effect. Further, Kozlowski and Salas (2009) identified coaching and mentoring as a specific area to be addressed in future research around structuring work to create advanced learners and expertise in the organization. However, coaching and mentoring as an intervention to improve e-learning has largely been ignored in research.

As a practitioner of over 20 years in the tech-sector and as someone who has spent considerable time developing learning processes and platforms to reduce

learning curve of new joiners in the financial technology space, I was therefore keen to explore the following:

1. What factors hinder learners from achieving the business-relevant outcomes, when employing workplace e-learning?
2. Does integrating a coaching and or mentoring component either affect or enhance business-relevant learning outcomes?
3. Can we implement a minimalist blend of coaching and mentoring, such that learning effectiveness improves without affecting either the convenience, or the cost merits of e-learnings?

In this paper, the term e-learning has been interchangeably used to refer to both pure self-paced online learning and blended learning, the superior and more effective method of learning where such self-paced online learning is mixed with interaction with instructors or other subject matter experts in the organization. Likewise, the terms coaching and mentoring are also interchangeably used in this dissertation since the learning process within the workplace focuses on short-term task and performance improvements as much as longer-term competence and capability building. While coaching represents the usually formal intervention to help with specific skill and behavioural development needs, mentoring represents the typically informal intervention by a senior member to advise, coach or promote a junior member in their career developmental needs (Chao, 2007). There is sufficient overlap in these methods especially when internal managers and peers are leveraged, and these interventions are delivered alongside the e-learnings.

1.4. Contribution summary

If minimalist coaching and mentoring, or micro-coaching, can address some of the inherent inadequacies of self-paced e-learning and provide the self-regulation and scaffolding needed to achieve the right learner outcomes, the resultant model would be a significant contribution to both theory and practice. For workplace practitioners a cost-effective way to involving internal line managers and peers as coaches to significantly improve business outcomes from learning investments could prove useful. For theoreticians, an integration of coaching and workplace e-learning could open up a new field of micro-coaching in technical domain, an area that is fairly new to coaching and mentoring.

1.5. Dissertation structure

This dissertation is organized in the following chapters.

Chapter 2, in the immediately following section, presents the theoretical context with respect to characteristics of workplace e-learning and the mixed-mode integration being proposed to improve effectiveness. Here, from grounded theory research, I explicate the relevant learning outcome measures, factors that influence the learning outcome measures, coaching, and factors that influence learning outcomes from coaching interventions, and how integration of the training methods could lead to better learning performance.

This is followed by Chapter 3, which presents the conceptual model and a summary of the research hypotheses.

Chapter 4, following the conceptual model section, presents the research methods consisting of two studies. Chapter 4.1 covers synopses from a series of semi-structured interviews with six practicing leaders in the tech-sector, who have substantial prior exposure to implementing or leveraging e-learning for their internal workforce and given their direct responsibility over a large workforce substantial benefit from participating in this research. Chapter 4.2 summarizes findings from a field experiment into e-learning with differing levels of coaching intervention to assess the impact on learning outcome measures.

Chapter 5 then presents a discussions section detailing the findings and contributions of this research. Chapter 6 concludes the dissertation and provides directions for future research in this topic.

2. Literature Review and Hypothesis

2.1. Brief Background on Learning at the Workplace

Succinctly put, learning is the process of acquiring new knowledge, skills, abilities and attitude, followed by retention and sharing of the same in order to exhibit new work behaviours (Argote, 2012). A learning cycle completes through a feedback that signals a goal achievement. Continuous learning refers to regularly acquiring and updating one's knowledge and skills to adapt in a changing world. (Sessa & London, 2015). Such learning in the workplace is both formal and informal (Marsick & Watkins, 2015) and happens in an organization at the levels of individual, group, communities, organization, networks, and region (Tynjälä, 2008). Within this paper, the unit of analysis is the individual and therefore I focus on individual learning and its related outcomes as the point of focus.

Individuals within the workplace context learn in a self-directed manner (Knowles, 1975) and for this learning to be effective involvement of declarative and procedural knowledge, problem solving strategies, and creative thinking and attitudes are all key capabilities. One of the primary means by which most firms build such knowledge and capabilities is via education and training, access to learning resources, expert guidance and feedback.

Individuals, however, learn at work through not only formal training but also doing the job, working with others internally and externally, reflecting on and evaluating experiences, and through extra-work contexts (Collin, 2002; Collin &

Valleala, 2005; Eraut, 2004). Interaction amongst peers and managers, and novices with subject-matter experts also creates learning (Fuller & Unwin, 2002). Apart from this tacit learning, which are critical for successful outcomes, also occurs at the workplace through reaction to work situations and incidents (Tynjälä, 2008).

2.2. Growth of Workplace e-learning and Blended Learning

In today's fast paced world, employees are expected to manage their own learning, which gets exacerbated in an environment where multitudes of problem solving capabilities and interaction behaviours are required to succeed. Rapid introduction of new technologies mean that employees have to be multi-skilled and for this they are perpetually engaged in new learnings all the time. Hence, there is a shift to a new learning paradigm of self-responsible and self-organized learning for development of lifelong learning skills and flexible, individualized and personalized learnings (Serrat, 2017). Due to time constraints, however, learning is resorted to mostly when an employee is stuck with a work problem. So, there is a demand for easier delivery methods and an appetite for just-in-time and micro learnings customized to the required job competencies and even the specific work at hand.

With the digital-age technologies advancing in parallel, it has become easy to make the learning resources available over electronic mediums and there is widespread adoption of technology driven learning, or e-learning, in the workplace. Today, market leading companies innovate in the corporate e-learning settings

(Baranik, Roling & Eby, 2010) and offer a multitude of options for the employees to learn and grow. This is most visible in the technology sector and within the IT departments where knowledge churn (loss of irrelevant knowledge and its replacement with current knowledge) is much faster and reskilling and adapting to new technologies is required for the individual to remain relevant to the organization. Recently, other sectors and other departments within the firm have also been impacted by advances in technology and feel the need to continuously acquire new knowledge (Clark & Mayer, 2016; Cheng et al., 2014). Combined with its anytime and anywhere availability, cost effectiveness and delivery efficiency advantages, e-learning has therefore become ubiquitous in the workplace (Rosenberg, 2005).

In the last few years, there has been a considerable increase in online delivery of learning, which is predominantly self-paced, and a greater emphasis to supporting workplace performance through learning and development (Overton & Dixon, 2018). Although e-learning started off as a complement to the traditional face-to-face training and development (Wang, 2018), as the volume and variety of required knowledge mounts, organizations are more frequently purchasing these learnings off-the-shelf or signing up with online learning providers. In both instances, management is increasingly leaving the employees to self-manage their learnings. One important point to note here is that in most organizations mandatory learning, which is usually required for compliance purposes, is purely driven via e-learning and these are centrally coordinated from a completion tracking standpoint.

Blended learning, or a combination of face-to-face and e-learning, allows for a combination of traditional and online methods to coexist with the support of a learning management system (Graham, 2006). In the corporate context, a majority of the learning occurs via online learning, and an instructor interacts during planned face-to-face meetings. While it is not a prerequisite to having the face-to-face component on the platform, interaction is also done over the electronic media for ease of use and cost reasons. According to Kimiloglu, Ozturan & Kutlu (2017), many companies looking to complement e-learning with traditional training are looking into blended models as the ideal approach to deriving cost and convenience benefits as well as increased employee readiness and commitment. In a survey by the UK's Chartered Institute of Personnel and Development (2015), 59% of the organizations believed there will be a growth in e-learning over the next couple of years and around 40% of the organizations also predicted a growth in blended learning over the next two years, particularly highlighting that e-learning is more effective when combined with other learning methods. The emergence of blended learning has helped bridge the gaps between formal and informal learning and between education and work (Wang, 2018).

2.3. The Learning effectiveness conundrum and the research gap

Despite the near continuous technological advancements over the last two decades, e-learnings do have several barriers affecting their success. As explained earlier, this is very much evident from the increased research in to effectiveness of e-learning by several authors and practitioners (Noesgaard et al., 2015). While e-

learning platforms can enable very high levels of interaction with instructor, materials and community alike, the preferred asynchronous nature of the interaction in the workplace constrains knowledge acquisition and retention more often than not. Apart from that of mandatory compliance learnings, organizations are still looking at sign-up and completion rates as measures of e-learning success when perhaps they should be measuring real knowledge and business outcomes. Bulk of the e-learning, which are voluntary and discretionary in nature, are typically not directly linked to tangible outcomes such as performance appraisals or promotions (Tracey, Swart & Murphy, 2018). Even in the case of mandatory learnings it is very much a practice in all organizations to do extensive follow-up to ensure completion, which points to the flexible nature of e-learning imposing lesser constraints and therefore greater self-regulation and intrinsic motivation demands (Goda et al., 2014).

DeRouin et al. (2005a) observed that the potential of e-learning to an organization depends on how the e-learning designed, delivered, and evaluated. Harris, Connolly & Feeney (2009) noted that the generic nature of the content and a minimal or a lack of interaction continues to be a put-off to learners. Similarly, replication of the traditional delivery without feedback (Welsh, Wanberg, Brown & Simmering, 2003) and deficiencies with respect to pedagogical principles around incorporating learning achievements in work context (Tynjälä & Häkkinen, 2005) also affect learning results.

McDonald (2012) noted in his dissertation that face-to-face sessions interluded with e-learnings provide the required interaction and feedback that guards against procrastination, one of the problematic issues when it comes to e-learning (Graham, 2006).

Bernard et al. (2014) surmised from their meta-analysis that the effect of technology integration is effective to a modest but significant degree and that there is merit in continued investigation of blended learning as a potentially superior alternative to classroom and online learning. The researchers further highlighted that future research into blended learning should look at designs that facilitate motivation and self-regulation (Abrami, Bernard, Bures, Borokhovski and Tamim, 2011), which can then lead to purposeful interaction that creates deeper and more meaningful educational experiences.

Boelens et al. (2017) highlighted that many of the e-learnings do not offer the learners full flexibility over the blended option, in direct contradiction to learner autonomy. Moreover, these delivery models do not yet offer enough help to facilitate learners who lack self-regulation and self-direction, two important traits needed to operate in a learner-centric environment. This research also suggested that introducing interaction and facilitating a better learning climate are the other two challenges to the design of blended e-learnings.

Van Laer and Elen (2017) explored reasons for success of blended learnings. They highlighted that such e-learnings challenge the self-regulatory behaviours of learners and identified seven key attributes such as authenticity, personalization, learner control, scaffolding, interaction, reflection, and calibration cues that would foster self-regulation and therefore maximise learning outcomes.

Noesgaard (2016), highlighting the various stages of motivation needed from enrolment to completion of e-learnings, which is plagued by the challenges of self-regulation combined with low-entry and exit barriers, proposed that individualized on-the-job scaffolding support, or temporary and just necessary support provided by the knowledgeable other to help develop competence faster and better than if unassisted (Wood, Bruner & Ross, 1976), will make learning transfer and associated work behaviours sustainable.

Wang, 2018, clearly observed that e-learning in the workplace should move away from technical fads to incorporating adult learning principles, which facilitate and guide self-management and self-direction, provision adaptive and timely feedback, encourage and support collaboration amongst peers, and eventually foster learner motivation and better engagement.

Summarizing 100 years of training and development research, Bell, Tannenbaum, Ford, Noe & Kraiger (2017) observed that training effectiveness in e-learning is determined not by the technology but by the design of the instruction

and support provided to the learners. They further observed that complex skills acquisition occurs via training designs that drive more active and self-regulated learning.

Given this background and the extensive mention of interaction, feedback, scaffolding, and self-regulation as a key factor of e-learning success, the research focus of this study is to explore blending solutions that could better address this requirement and thereby boost learning outcomes substantially. It has been noted that earlier research had focused on stand-alone instructional re-design for cost reasons without giving much consideration to advancing work practice (Noesgaard, 2016), therefore this study sets out to evaluate combining e-learning with coaching, which has been hypothesized to help individuals learn to self-manage and achieve work related goals (Poepsel, 2011). As has been noted before, McGee and Reis (2012) and Bonk and Kim (2004) have highlighted coaching and mentoring as a possible face-to-face component of blended learnings. One very important consideration was to identify an intervention that retained e-learning's cost and convenience benefits, as this is a key factor that has made e-learning the preferred medium of training in the first place.

2.4. Coaching and Mentoring

A coach works with others to develop and implement strategies to improve their performance (Hall, Otazo & Hollenbeck, 1999). Coaching is defined as an interactive, facilitative process of equipping people with technical, professional and

interpersonal skills and behaviours required to operate effectively (Peterson & Hicks, 1996). Coaching also helps in inducing an active rather than passive learning, by which employees take responsibility for driving their own learning processes (Bell & Kozlowski, 2008). In many ways coaching is similar to facilitative teaching where the perceived expert provides wise guidance to the learner and helps them perform their tasks better. A coach helps guide the individual to self-reflect, set goals and get cues to directing self-learning in order to achieve success (Bond & Seneque, 2013).

Likewise, mentoring (usually referred to in a dyadic manner) has long been associated with employee development (Noe, 1996). It is believed that mentoring facilitates learning by virtue of its social interactive nature and allows for both the transfer and co creation of knowledge among individuals (Wang, 2018). A supportive mentor, guides and counsels the individual and typically provides both career advancement and psychosocial development benefits (Kram, 1985). Both coaching and mentoring have both learning related and emotional support related characteristics (D'abate, Eddy & Tannenbaum, 2003).

Within a learning context, a coach would remind, motivate, teach and create accountability for the learners with whatever learning that needs to be accomplished. Garrison, Anderson & Archer (2010) in their community of inquiry model, referenced this support as helping with initial guidance on selection of skills to acquire (aka. Cognitive presence) followed by tracking and monitoring of progress

(aka. Teaching presence) and correcting knowledge/skills acquired through encouragement of discourse (aka. Social presence).

Mentoring helps with cognitive, skill-based and affective learning thereby enhancing declarative, procedural and tacit knowledge, improving technical or motor skills, and enabling attitudinal or motivational changes in individuals (Wanberg, Welsh & Hezlett, 2003). The protégé or mentee acquires these traits and characteristics based on the accumulated experience of the mentor (Kram, 1985). Further, personal learning such as problem solving and decision making as well as relational learning such as understanding interdependencies and organizational culture are also distal but important outcomes (Lankau & Scandura, 2002) in traditional mentoring.

Within a work context, Bishop (2016) observed that coaching and mentoring is associated with improving performance levels, driving individuals towards planning and carrying out duties, and achieving better results and creativity. Meta-analysis conducted by Jones et al. (2016) demonstrated the positive effects of workplace coaching on employee learning and development in organizations, with several interesting findings. Not only was it found to be more effective when conducted by internal coaches, it was more effective when multi-source or 360-degree feedback was excluded. Furthermore, when video conferencing and face-to-face coaching delivery was compared there was no noticeable difference.

2.5. Blending Coaching with e-learning

Coaching helps learners transfer skills to practice and move from a know-it to the do-it level (Stevens & Frazer, 2005). Combining coaching and e-learning could therefore help accelerate not just learning, but also improve business outcomes. However, within the current workplace e-learning contexts, traditional coaching and mentoring support services could be costly to implement and difficult to scale up (Bloom, 1984). Some recent studies in social psychology point to a model that could change this perception and make this blending more feasible. Bright and Crockett (2012) observed that even a one-time coaching session provides effective learning transfer and therefore could be a cost-effective learning method for organizations favouring e-learning. McGee and Reis (2012) have pointed out that continuous human interaction is not what self-directed learners want and could even become a source of resistance. Noesgaard (2016) has observed that one-to-one scaffolding where and when necessary can be cost efficient and yet effective to make work behaviours sustainable. Jones et al. (2016) also concluded that shorter coaching interventions could potentially be more cost-effective. In an experiment testing online-only versus online plus a one-time group coaching versus online plus one-on-one coaching by senior students, Oreopoulous and Petrojinevic (2016) found that online plus one-on-one coaching had a positive impact on the first year undergraduate learner course grades. Therefore and putting this all together, minimal yet face-to-face coaching and mentoring by internal managers and peers combined with online learning could target the learners' motivations to

learn (Walton, 2014: Yeager & Walton, 2011) and possibly lead to greater and long-lasting learner outcomes.

Following these findings, we propose that a minimalist coaching and mentoring approach, or micro-coaching model, can be developed as a cost-effective blend to e-learning in which peers and managers function as internal coaches and mentors. The proximal outcomes from both coaching and mentoring would help improve necessary cognitive and affective outcomes that can deliver better learning results. The distal outcomes of personal and relational learning could also further boost overall benefits and lead to better business outcomes. Such coaching interventions could be done leveraging the virtual connect capabilities of existing learning platforms rather than otherwise costly technological upgrades such as augmented reality or artificial intelligence. This low tech, internal solution could thereby provide a cost-effective yet human interaction model of making e-learning more effective.

The next section describes the theoretical foundations of workplace e-learning and coaching, and the effect of integrating the two methods of learning with respect to learning and ensuing business outcomes.

2.6. Theoretical foundations and hypotheses

Workplace learning is underpinned by multiple theories such as adult learning, self-directed learning, experiential learning, and communities of practice

(Wang, 2018). Coaching and mentoring, on the other hand, has its roots predominantly in psychology though also borrowing from other disciplines such as philosophy, sociology, anthropology, sports, and communication science (Theeboom et al., 2014). Before delving into the factors and underlying theories affecting workplace learning and coaching, it is important to outline the primary dependent and independent constructs that are of importance to this study.

As stated previously, for workplace e-learning to be effective, it is important that individual learning outcomes of competence or actual knowledge and its retention over time (Velada, Caetano, Michel, Lyons & Kavanagh, 2007), the associated increase in self-confidence (Crouse, Doyle & Young, 2011) and organizational outcomes of training transfer or on-the-job performance (Baldwin & Ford, 1988) are successfully achieved. This should, then, lead to a culture of continuous learning that positions the organization as a leader in the marketplace. These are the dependent variables of the study that practitioners surveyed in the semi structured interviews and researchers cited in the literature review are also interested in.

Several integrative works point to the determinants of these learning outcomes as individual learner characteristics, training design and work environment factors (Burke & Hutchins, 2007). Within the context of workplace e-learning, training design for self-directed and self-paced learning may be treated as a constant and therefore learner variables and environmental influencers are the

primary independent variables of interest. However, with the study objective of investigating coaching and mentoring interventions, and their ability to make learning effective, it is important that coaching design and coachability of an individual are also considered amongst the factors. For the sake of clarity, the variables are italicized in the following section.

2.6.1. Learning goals and Learning outcomes.

Effective learning is most likely to occur when clear learning goals are set, and it is easiest to evaluate when performance measurement is done to confirm the changes to knowledge, skills, attitudes, and behaviours. Within an organizational context, the individual learning outcomes can include a wide set of categories such as task performance, organizational awareness, cognitive and personal development, teamwork, role performance, decision making and judgement (Eraut, 2004).

However, within the context of a learning activity, Kirkpatrick's (1994) four-level model has long been used as a comprehensive framework to evaluate learning outcomes, and it consists of (a) reaction outcomes, which measure a learner's satisfaction with the learning activity itself, (b) learning or cognitive outcomes, which refer to the acquisition of knowledge and skills, (c) behavioural outcomes, which refer to change in behaviour towards the job and (d) business results, which refer to the absolute work outputs resulting from the learning.

Reaction refers to the *affective* outcomes, which consist of both attitudinal and motivational outcomes such as satisfaction, usefulness, perceived difficulties and self-efficacy (Kraiger, Ford & Salas, 1993; Bandura, 1977). Warr and Bunce, 1995, demonstrated three distinct reaction measures 1) learner satisfaction, 2) its perceived usefulness and 3) perceived difficulty. While learner satisfaction, is the easiest to measure and widely used, it does not have a significant relationship with performance (Alliger, Tannenbaum, Bennet Jr, Traver and Shotland, 1997) and therefore can be ignored. Overall, reaction measures provide inputs to improving learning activity and induce further learning more than impacting direct business outcomes.

Cognitive learning outcomes include declarative or subjective knowledge, procedural or work-specific knowledge and metacognitive or higher-order thinking knowledge, which respectively refer to the understanding, apply and analysis levels of Bloom's (1956) taxonomy of learning within the knowledge work context. Metacognition reflects the amount of thought, monitoring and planning done by the individual during the learning process to achieve the level of learning (Ford, Smith, Weissbein, Gully & Salas, 1998). This should lead to long-term knowledge retention, or retained knowledge, which is more relevant as more often than not cognitive outcomes decline if the training is ineffective or not useful (Bechtold, Hoffman, Brodersen & Tung, 2018).

Behavioural outcomes refer to actual on-the-job performance in terms of change in behaviours demonstrated at the workplace after the learning. Alliger et al. (1997) refer to this as learning transfer or training transfer. Parker (1973) in their model of evaluation noted that observable changes in on-the-job behaviour could be an indication of the improved work performance. Warr, Allan & Birdi (1999) also demonstrated that another affective state at the end of learning activity is the motivation to transfer, or the willingness to apply the learning, which is a primary measure of learning transfer to the workplace and therefore on-the-job performance. It should be noted, however, that one of the oft quoted shortcomings of Kirkpatrick's model is that behavioural outcomes do not necessarily mean that skills are successfully transferred or applied at the workplace to achieve the job outcomes.

Results criteria measure actual business outcomes like sales, productivity etc., which in practice is difficult to attribute to the underlying learning activity (Arthur et al., 2003). That is, many business outcomes can often be influenced or affected by external factors such as competition, customer conditions, and the marketplace, rather than learned activities of the focal employee.

From a practical standpoint with respect to measuring and improving, cognitive outcomes or learning gain and on-the-job-performance (Wang, 2018) are more business relevant and directly related to the quality of the learning activity. Further, the reaction to the activity should induce a motivation to learn further and

drive to a state of continuous learning (Sessa & London, 2015). Therefore, we focus on these as the primary dependent variables for the study.

2.6.2. Definition of Learning Outcome Measures.

Cognition.

The resultant learning gain (or *cognition*) refers to the knowledge an individual takes away from the learning activity to apply on the job. It is important that this knowledge is assessed at the three distinct learning hierarchies of factual understanding, situational application and higher-order extension (Bloom, 1956). Cognition is typically operationalized via absolute performance test scores or grades as well as change in test scores between two-time intervals. As observed earlier, retained cognition, or a measure of cognitive outcomes after a time interval, would help even better to determine the effectiveness of a learning activity. Change in scores then help us to understand the actual incremental learning outcomes achieved and normalizes any prior differences in competence and understanding levels amongst the learners (Warr et al., 1999). However, with business relevance in mind, absolute scores of *cognition* as well as *retained cognition* are seen as critical measures of the study.

Perceived job performance.

On-the-job performance refers to the improved performance in the workplace resulting from learning and development activities. While this cannot be directly attributed to a single learning activity, following Warr et al. (1999), the

observable on-the-job performance (or *perceived job performance*) could be measured through the confidence and willingness to use the learnings. This is operationalized by using self-ratings and face-to-face supervisor or assessor ratings in the study.

Self-ratings are known to differ from supervisor-ratings. This is because, while an individual's self-rating will be a reflection of one's self-efficacy and motivation, supervisor-ratings usually tend to be based on abilities (Lane & Herriot, 1990), assessed via demonstration of actual learning achievements, and the associated confidence. Given that motivation variable is a key part of this study, the subjective self-rating and the more objective supervisor rating are both deemed important and included in the study.

Continuous learning (motivation to learn further).

Continuous learning refers to a state of motivation in the individual that drives them towards a self-managed career-long learning process (London & Smither, 1999). The improved cognition and job performance from previous learning enhances the motivation to learn and encourages the learner to pursue further learning thereby creating a virtuous cycle. These attitudinal and motivational outcomes, which direct the learners to learn further, are operationalized as '*motivation to learn further*' or *'changed motivation to learn'* in the study.

2.6.3. Learning Motivation.

Learning effectiveness is influenced by learner characteristics, learning design and delivery and organizational or environmental factors (Bell et al., 2017). Extant literature on training has acknowledged that apart from general cognitive ability, an individual's *motivation to learn* explicates much of the incremental variance in learning outcomes and that this in turn is influenced by individual, instructional and environmental characteristics (Colquitt, LePine & Noe, 2000; Klein et al., 2006). Adapting the training motivation theory for e-learning, Rentroia-Bonito & Jorge (2004), created the construct "motivation-to-e-learn" by incorporating e-learning related elements into the mix. This hypothesized "motivation variable" borrows from theories as diverse as social cognitive theory, identity theory, self-efficacy theory, expectancy theory, captology and systems theory. Understanding this motivational construct in detail to identify what makes motivation work is key to understanding what will make learning more effective and what impact, if any, coaching and mentoring intervention may have on the outcomes.

Individual characteristics.

Learning may or may not occur to the desired level in all individuals due to some of the intrinsic characteristics and other habits developed at the workplace. Of particular interest are the characteristics that influence the motivation and outcomes in face-to-face training given the intervention of coaching and mentoring being tested in this study.

Learning Goal Orientation, which creates a desire in a learner to achieve competence by acquiring new skills, mastering new behaviours and creating a yearning to be positively evaluated (Locke & Latham, 1990; Bell & Kozlowski, 2002), is a key individual characteristic affecting learning and determines the effort and priority allocated by an individual to learning (Fisher & Ford, 1998). Button, Mathieu & Zajac (1996) noted that learning goal orientation is associated with higher willingness to participate in training, and a tendency to continually challenge past previous goals. Therefore, the higher the learning goal orientation, the higher the learning motivation.

Self-efficacy or Self-esteem, derived from the social cognitive and self-regulating behaviours of the individuals, refers to the ability of an individual to set and achieve their own learning goals (Bandura, 1977) by being positive and confident (learning self-efficacy). Davis (1989) developed the technology acceptance model based on the theory of reasoned action (Fishbein & Ajzen, 1975) and highlighted that the behavioural intention of the learner will be largely influenced by their perception of how much the learning activity will improve their job performance, help them achieve their objectives and help them with their career (*perceived usefulness*), which in turn drives learning outcomes. Warr et al. (1999) also demonstrated that perceived usefulness and perceived difficulty, or anxiety with respect to expectations from the learning activity impacted the learning outcomes (learning anxiety). Their results further suggest that there is considerable

overlap between learning anxiety and learning self-efficacy and these could be combined into a single concept of *learning confidence*. Both higher perceived usefulness and higher learning confidence are expected to positively influence learning motivation.

Self-regulation is a process of influencing the external environment and achieving desired learning goals through control of one's behaviour, emotion, thought, and motivation (Bandura, 1991). Self-directedness or Self-regulation is that intrinsic responsibility within an individual which makes them be determined to successfully achieve the goals and expectations set by their organization (Deci & Ryan, 1985). Knowles' (1975) adult learning theory proposed that adults learn in a self-directed manner through various life experiences and driven by motivation, they tailor their learning to their own styles and acquire the necessary knowledge, skills, and attitudes to be successful (Boyer, Edmondson, Artis & Fleming, 2014). Such self-regulatory processes can strengthen the relationship between ability, self-efficacy and goal orientation and learning outcomes over time (Bell et al., 2017). Therefore, higher self-regulation leads to higher learning motivation.

Learning Strategies also play a part in driving learner outcomes and academic research has progressed to a stage where interventions are used to influence performance (Kardash & Amlund, 1991). Such learning strategies could be categorized as cognitive, behavioural and self-regulatory (Warr et al., 1999). Of importance are the behavioural strategies which involve feedback-seeking

behaviour and self-regulatory strategies such as emotional control and motivational control, which are better amenable to face-to-face interaction within the workplace e-learning context. Timely intervention of behavioural and self-regulatory strategies could lead to better learning motivation and thereby learning outcomes.

The rest of the individual factors refer to demographic or intrinsic factors. Psychological Development Level, which can be categorized in to six life stages that closely follow the chronological age (Levinson, 1986) and the five orders of consciousness (Kegan, 1982), which an individual evolves through during a lifetime, has an impact on an individual's learning cycle. Personality traits are a well-known source of differentiation amongst individuals and are highly correlated to individual's performance in the workplace. Of the Big 5 personality traits, conscientiousness (i.e., tendency to be orderly and industrious), and openness to experience (i.e., tendency to be open to ideas, feelings, values, aesthetics, and actions) are significantly correlated with a motivation to learn and make a learner reliable and self-disciplined and therefore committed to the goals (Barrick & Mount, 1991; Major, Turner & Fletcher, 2006). Schmidt and Hunter (2004) found that general mental or cognitive ability or 'G', which was postulated by Spearman (1904) more than a century ago, is still a very good indicator of an individual's ability to learn and perform at the workplace. Smarter individuals will be able to better acquire and retain knowledge and therefore manage their career better, which in turn drives them towards further self-development (Arthur & Rousseau, 1996). Age, prior qualification and experience have been known to have varying levels of

impact on learning performance (Kubeck, Delp, Haslett & McDaniel, 1996). However, within a work context, recruitment, and talent management policies do adjust for these differences and it is the motivational factors detailed earlier that usually determine whether an individual leverages the learning facilities for the better or not. It should be further noted that interaction interventions will not have any impact on these factors either. Therefore, such demographic or intrinsic factors could be considered constant and left as control variables in the study.

Instructional Characteristics.

This refers to the delivery mode and design of the e-learning activity. While the self-directed e-learning has a higher amount of learner control, it also has a lot of potential for distractions and interruptions and the inherent design allowing for asynchronous connectivity affects the opportunities for face-to-face interaction (Klein et al., 2006). In this environment, learners with higher motivation will be able to learn more effectively.

Following from social presence theory (Short, Williams & Christie, 1976), *instructor presence,* or availability of an instructor in asynchronous e-learning, helps improve communication and interaction and therefore motivation to learn. This not only allows for tacit learning to be acquired but also for timely clarifications that would keep the learner engaged in the learning activity until completion. Consequently, a delivery model that fosters instructor presence will improve learning motivation (Baker, 2010).

Organizational Characteristics.

Organizations can foster learning by having a supportive organizational culture and structure (Renner et al., 2015) and favourable policies and systems (Tracey & Tews, 2005) that emphasize on learning goals (Dweck & Leggett, 1988), provide managerial and peer support and guidance for encouraging learning activities (Cheng et al., 2012), and include learning achievements as part of performance management and incentivization to drive continuous learning. Maurer (2002) refers to this as work context and Warr et al. (1999) refer to this as the "transfer climate". This will help remove any perceived barriers and enable progress (Lent, Brown, & Hackett, 2000). Therefore, a supportive transfer climate that engages managers and peers within an organization should lead to better learning outcomes. Cheng et al. (2012) demonstrated that managerial support, job support and organizational support within an organization is positively correlated with an individual's perceived usefulness and therefore their learning motivation and resultant learning results. These can be combined linearly as the *perceived learning support* provided by an organization.

In sum, *Learning goal orientation*, *Perceived usefulness*, *Learning confidence*, *Self-regulation*, *Learning strategies*, *Instructor presence* and *Perceived learning support* combine to denote an individual's internal set of cognitive and behavioural processes that have a positive effect on the learning outcomes.

2.6.4. Definition of Motivation to Learn Measures.

The factors identified in the previous section compare well with Rentroia-Bonito & Jorge's (2004) intrinsic related, e-learning related and immediate-context related factors that help focus participants towards learning in a self-directed and self-paced workplace e-learning context. It should be noted that infrastructure related factors are no longer a matter of concern within today's blended learning models, where infrastructure support has improved significantly. Therefore, it is more the face-to-face interaction aspects that will differentiate the learning outcomes, particularly so, given the learner-system-coach interaction focus of this study.

A linear blend of these factors, is therefore combined to measure the composite *'motivation to learn'* construct, which then provides for a quantitative means of evaluating e-learning outcomes. This could be measured by adapting from existing scales for the individual elements.

2.6.5. Integration of Coaching and e-learning.

Jones et al. (2016), observing that coaching is very much compatible with the conceptualization of learning and development activities in aiding individuals to achieve improvement goals, found a high degree of positive effect on the cognitive and affective outcomes through encouraging self-directed learning. Theeboom et al. (2014) demonstrated through their meta-analysis that coaching positively influences goal-attainment expectancy and therefore motivation and

performance of the individual (Locke & Latham, 1990). Grant (2003) demonstrated that solution focused cognitive-behavioural coaching with a lesser focus on self-reflection has a positive impact on self-regulatory cycle of an individual, leading to enhanced mental health and goal attainment. Grant, Curtayne & Burton (2009) showed that coaching helped increase self-confidence and resilience while reducing anxiety and stress. This in turn leads to building self-efficacy and therefore fosters motivation to develop.

Nortvig et al. (2018) suggested that even in an e-learning environment, where some learners may want to have self-paced and self-directed learning, an educator presence helps in creating a sense of belonging to a learning community and therefore learning achievements (Joksimović, Gašević, Kovanović, Riecke & Hatala, 2015). Baranik et al. (2010) found evidence for perceived organizational support being a mediator of the impact of coaching and mentoring on work attitudes. Internal managers and peers, when performing coaching and mentoring, would be perceived as support from the organization for the learning activities (or perceived learning support) thus motivating the individual to learn further. Therefore, presence of a coach or mentor in a learning activity, helps improve the individual's overall motivation to learn through continuous feedback and thereby leads to better learning outcomes (Stein, Wanstreet, Slagle, Trinko & Lutz, 2013).

Theeboom et al. (2014) and Jones et al. (2016) have reported in their meta-analysis that having a large number of coaching sessions did not have significant

moderation of impact on the effectiveness outcomes. They have, however, recommended that even short-term coaching could be beneficial even though the underlying studies did not test for cognitive outcomes and had not clearly articulated the type of coaching, and the methodology applied. Grant et al. (2009) testing for both goal setting and attainment also showed that short-term coaching could be effective. Although, their work did call for a proper comparison of short-term and long-term interventions. Following this, there is reason to believe that having only few coaching sessions in tandem with e-learning could produce the desirable learning effects and that, in fact, there could even be resistance (McGee and Reis, 2012) if the interaction increases. In sum, presence of a coach has a positive, possibly non-monotonic, relationship with an individual's motivation to learn and the learning outcomes and additionally, presence of a coach moderates the relationship between motivation to learn and the learning outcomes.

This minimalist coaching approach that could lead to more effective learning outcomes is what I call micro-coaching. Such a model, with an internal coach spending short-bursts of time over a few sessions, may be affordable within the time-constrained work environment of today and still keep the e-learning cost-efficient while improving effectiveness. Leveraging managers and peers, who are subject matter experts, as internal coaches also has a direct bearing on a learner's cognitive and behavioural outcomes and allows for better understanding of organization-specific, procedural and tacit knowledge, which may not be well captured in the e-learnings. Thus presence of a coach enhances learning outcomes

of cognition and on-the-job performance within the workplace e-learning context. Further, the improved learning outcomes could motivate the individuals to learn further and therefore presence of a coach, even minimalistic, could create a continuous learning culture.

2.6.6. Definition of Coaching measures.

Presence of a coach is operationalised through the number of coaching sessions as well as total time spent on each of the coaching sessions. While the number of sessions itself could be a reasonable operationalisation of this intervention, the total time spent could provide a better indication of the intervention effort associated with the improved learning outcomes.

2.6.7. Control variables.

As noted earlier, age, gender, culture, educational qualifications and experience (Kubeck et al., 1996) have a bearing on learning performance. Further and as explained before, personality traits of conscientiousness and openness to experience (Barrick and Mount, 1991), as well as cognitive or general mental ability (Spearman, 1904) have a bearing on learning outcomes. In addition, *coachability*, which is a combination of personality traits (e.g., agreeableness, openness to experience) and motivational components (e.g., achievement motivation), is also known to make an individual more receptive to feedback and development and thereby aiding the coach to drive performance improvements (Theeboom et al., 2014).

While most of these factors are normalised in workplace settings through various organizational policies and procedures, and in studies through random assignment of individuals, a couple of these factors require to be considered as control variables given the nature of this particular study. Measuring these would be helpful for post-experiment validation and explanatory purposes.

The existing cognitive or general mental ability of an individual, or *prior cognition*, may have a bearing on the cognition outcomes especially in self-directed learning contexts. This could be measured through a test for general verbal and numerical aptitude.

Coachability, or a person's openness to being coached, would impact the ability to which a person could be motivated to learn within a e-learning and/or face-to-face learning construct. Hunt and Weintraub (2011) described this as curiosity, and a desire to learn and develop. This could be measured by adapting from existing scales for coachability.

3. Summary of Conceptual Model

The conceptual model summarizing the key constructs and the hypotheses described are illustrated in the figure below.

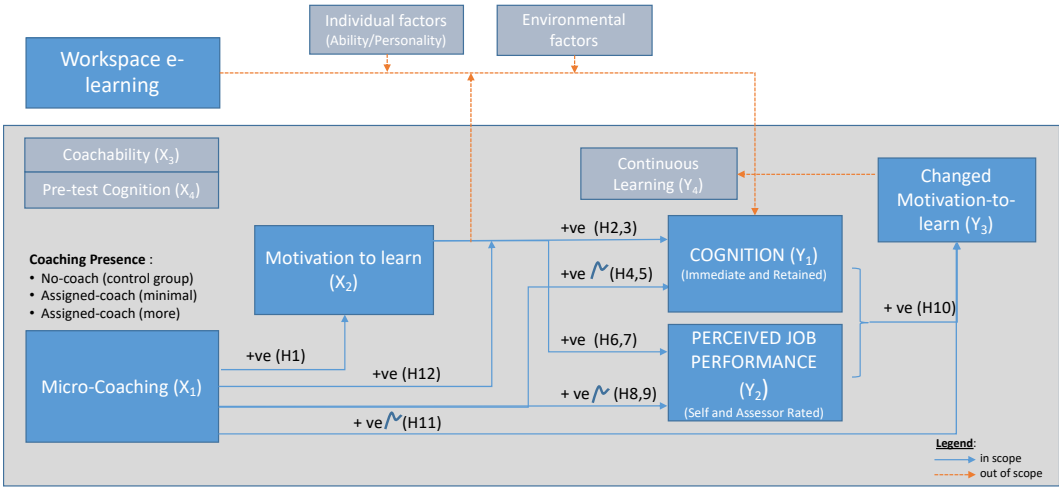

Figure 1: Schematic Representation of Conceptual Model

In sum, the hypotheses are as follows:

A coach, or a mentor understands what motivates an individual (Bishop, 2016), helps adapt their learning goals and strategies (Boyer Hallowell & Roth, 2002), interacts and supports as necessary to improve self-regulation (Van Laer & Elen, 2017), creates the right social interaction for knowledge transfer and co creation (Wang, 2018) and eventually guides individuals to self-manage and achieve their learning and work-related goals (Poepsel, 2011). Thus;

H1: The presence of a coach improves an individual's motivation to learn.

In the self-directed learning context of workplace e-learning, an individual's *motivation to learn*, encompassing the individual learner characteristics and preferences (Burke & Hutchins, 2007), perceived support from work-context

related factors (Colquitt et al., 2000) and preference for e-learning related instructional characteristics (Rentroia-Bonito & Jorge, 2004) is the primary determinant of much of the learning outcomes. As noted in the literature review section, business outcomes specific to learning are its cognitive and behavioural outcomes (Kirkpatrick, 1994). Within cognitive outcomes, both cognition or the short-term memory recall and *retained* cognition or the long-time learning retention (Bechtold et al., 2018) are equally important. Thus :

H2: The higher the motivation to learn the higher the cognition

H3: The higher the motivation to learn the higher the retained cognition

The presence of a coach not only increases an individual's motivation to learn but coaching and mentoring is also an effective aid for informal and personal learning (Noe et al., 2014). Further, interaction with the coaches and mentors, who are peers and managers within an organization creates learning (Fuller & Unwin, 2002) and acts as the scaffolding to help make complex knowledge transfer meaningful and sustainable (Noesgaard, 2016). Thus :

H4: The presence of a coach leads to higher cognition

H5: The presence of a coach leads to higher retained cognition

Behavioural outcomes of learning determines what and how successful, transfer of training happens at the workplace. Since real business results are difficult to attribute to underlying training, perceived job performance, or an observable measure of job performance linked to the abilities acquired, and the

associated confidence of applying the learning on the job, is used as the behavioural outcome of learning (Warr et al., 1999; Arthur et al., 2003). This perceived job performance differs when self-assessed versus when measured by a supervisor. While the self-assessment reflects one's self-efficacy and motivation, the supervisor assessment will reflect the real abilities and confidence demonstrated (Lane & Herriot, 1990). Both coaching presence and the motivation to learn positively influence this self and supervisor-rated job performance behaviour. Thus:

H6: The higher the motivation to learn, the higher the perceived job performance (self-rated)

H7: The higher the motivation to learn, the higher the perceived job performance (assessor-rated)

H8: The presence of a coach leads to higher perceived job performance (self-rated)

H9: The presence of a coach leads to higher perceived job performance (supervisor-rated)

In modern day organizations, continuous learning or a self-directed lifelong learning to acquire multiple skills to adapt to changing conditions is very important (London Smither, 1999; Sessa & London, 2015). Belzer (2004) observed that prior learning contexts influence a learner's perception of the current context and that creating the right interaction of materials, activities, and teaching can enable fuller and more successful learning experiences. Lamb and Brady (2005) also observed

that one of the factors that motivate individuals to learn further is that of having a positive earlier experience with education. Within workplace e-learning context, if individuals are happy with the prior experience by achieving their learning outcomes then they will be motivated to continue learning. Thus :

H10: The higher learning outcomes of cognition and perceived job performance is positively related with the changed-motivation-to-learn

Another factor that drives workplace learning is self-development. Since coaching and mentoring is one of the key interventions to guide self-development, presence of a coach will also guide self-development and therefore continuation of learning throughout one's work career. Thus:

H11: The presence of the coach has a positive relationship with the changed-motivation-to-learn

Finally, the number of coaching sessions and time spent in coaching is known to moderate the effectiveness outcomes of learning (Jones et al., 2016; Theeboom et al., 2014). Since motivation to learn is the only predictor variable within this learning outcomes study, thus :

H12: The presence of a coach moderates the relationship between motivation to learn and the learning outcomes of cognition and perceived job performance (self-rated).

Jones et al. (2016) also found evidence that a great many numbers of coaching sessions does not significantly change outcomes and therefore minimal number of coaching sessions may suffice for impact, thereby allowing for a possibility of minimalist or micro coaching model to be feasible and successful. McGee and Reis (2012) found that in a self-directed learning context like workplace e-learning too much human interaction could even be a source of resistance. Since the earlier research on minimal interventions were not conclusive, I hypothesize that coaching sessions may have a positive albeit non-monotonic effect with that of the learning outcome variables, with minimal coaching over no coaching having a larger impact compared to that of more coaching over no coaching. Subsequently, hypotheses ***H4, H5, H8, H9, H11 and H12 will all have a positive but non-monotonic relationship with the learning outcome variables of cognition, perceived job performance and changed motivation to learn*** respectively.

Since a primary focus in this paper was to conduct a quantitative field experiment, I conducted a series of semi-structured interviews with industry leaders to reconfirm the model and refine the experiment design. In the subsequent section the research methods and procedures are described in detail, and the test results are presented.

4. Research Methods

4.1. Overview

In the present research, two studies were conducted to analyse the current state of workplace e-learning effectiveness and investigate the effect of minimalist coaching and mentoring, or micro-coaching, interventions on e-learnings. The studies had several objectives. The first study consisted of a series of a semi-structured interviews to help determine if the problem identified was real, was important and pressing in the minds of professionals engaged in this domain and then seek inputs to further sharpen the focus and breadth of the hypotheses and help develop the language for communicating with participants for the second study. That is, firstly, I wanted to understand how important workplace e-learning is to practitioners and whether their view on the effectiveness gaps matched mine. Secondly, I wanted to ascertain what learning outcomes really mattered to the practitioners and whether there was support for the suggested intervention of coaching and mentoring to improve e-learning effectiveness. Then, I sought out to determine the factors affecting learning outcomes and investigate how coaching and mentoring interventions influence the motivational factors and therefore the learning outcomes. With this, the second study would be a quantitative field experiment actually measuring the effectiveness impact of coaching interventions on e-learning.

Given the grounded theory basis of this research, this mixed methods design was deemed appropriate along the lines of Bryman (2006) and Greene, Caracelli &

Graham (1989). The open-ended qualitative study would help triangulate the research gaps and assist in validation and/or modification of the measurement instruments developed for the ensuing quantitative study. Combining the qualitative study with the field experiment provides better credibility and helps demonstrate external validity for the proposed research hypotheses. The specific aims, predictions, and the findings are explicated in each of the studies below.

4.2. Study-1: Semi-structured interviews

Study-1 was an interview of practitioners, representative of a large cross-section of employers engaging in e-learning at the workplace. One aim of the study was to understand how prevalent e-learning in the workplace was and if the hypothesized effectiveness challenges are indeed true from a practitioner's viewpoint. Another aim of the study was to glean insights into factors that hinder e-learning outcomes, the measures of e-learning that are critical for business and what organizations are doing and or would like to do to improve the situation. This would give a better understanding of the problem and therefore help design the right interventions to improve effectiveness without compromising on e-learning's cost and convenience benefits. Finally, I also wanted to understand if there was support for coaching and mentoring interventions and if this would allow for internal managers and peers to be involved in the learning process.

4.2.1. Method, Sample, Procedures, and Measurements

A semi-structured interview methodology was adopted as this is by far the most widely used in mixed-methods research (Bryman, 2006) and this also allowed for free-format discussion with a smaller sample size. Only after the initial set of questions, specific discussions related to the idea of coaching and mentoring interventions were opened up to the participants. This allowed genuine inputs to be collected for further analysis and use in the quantitative study.

Participants were chosen from predominantly technology-focused organizations where learning new skills is a constant necessity and where e-learning is prevalent or being planned as a means of skilling, reskilling, redeployment and overall personnel development and growth. To avoid any selection bias, the participants were recruited from a mix of my prior work contacts from LinkedIn as well as contacts in the tech-sector obtained from acquaintances, and some cold call emails. Leaders with either regional or global technology responsibility, titles at the executive or managing director level and above, experience of at least 20 years and currently managing a large enough workforce where effectiveness through e-learning is mission-critical were short-listed and contacted for participation.

Six participants, spread across Singapore and India (but holding multiple country responsibilities), volunteered to participate. All the participants were assured that no personal data other than contact information would be collected and all of their inputs would be anonymized in the final report. Further, all participants

were told they would also review a synopsis of their inputs before finalization of the draft and eventually be provided with a copy of the final dissertation.

A questionnaire (as attached in Appendix-A) was developed to conduct the interviews. In line with the semi-structured interview methodology, the questions were left flexible and several follow-on questions were asked to ensure each interviewee provided the necessary inputs. Four discussion themes, presented below, were used to guide the interviews.

a) Prevalence of e-learning as a medium of training
b) Current state of e-learning effectiveness, including factors affecting the same and expectations on outcome measures
c) Suggestions and plans for improvements, and finally as an additional theme,
d) Support for coaching and mentoring interventions to improve effectiveness

The interviews were fixed over e-mail and conducted over phone calls lasting between 25 to 45 minutes each. The broad questions were also shared with the interviewees beforehand, so the actual conversations could be short and meaningful with my time focused more on interjections and presenting of scenarios to provoke thought and seek insights. The sessions were not recorded but notes were taken by me during the session and summarized into a synopsis along the key

themes identified. Table 1 provides a summary of the participants and their support for salient aspects of the present research.

Participant Code	**Roles & Responsibility**	**State of e-learning effectiveness**	**Views on Coaching intervention**	**Measures of Success**
PAR1 / Managing Director, Global Tech Consulting Services Major	Head of Shared services functions responsible for enterprise enablement	Works for mandatory learning, but otherwise lacks interactivity and so ineffective	Agree coordinated and facilitated learning helps; also learning circles help in acquisition of depth of skill	Learn concepts and ability to apply for business benefits
PAR2 / Head, Retail Bank Technology	Head of applications management and Dev-ops globally	Does not believe in e-learning due to lack of interaction	Agree that face-to-face interaction will help drive outcomes	Actual ability to deliver on the job
PAR3 / Executive Director, Global Captive (Operations)	Head of Learning and Development, covering up to 40,000 employees	Too much and effectiveness depends on the individual	Mentor to navigate the 'web of plenty' to leverage and benefit	Confidence to execute process improvements and innovations
PAR4 / COO, Large Insurance Company	Responsible for operations, technology, and sales agency development	Interaction levels lacking, which needs investment to build	Calls this 'interventionist training method' and would like to implement	Measure of actual business output
PAR5 / Country Head, Investment Banking Technology Captive	Responsible for global markets technology development and support	Good for mandatory courses; otherwise no self-motivation	Looks at informal support workgroups as performing similar function	MIS such as who has used up, completion rates and time to complete etc.

PAR6 / Managing Director, Global Bank Technology	Responsible for global production support services (2000+ workforce)	Good for mandatory courses; up to individual to benefit and equip oneself	Agree that micro-coaches could nudge and clarify and improve learning outcomes	Take-up and Completion rates

Table 1: Semi-structured Interview - Participant summary

4.2.2. Thematic Analysis

Since this study was done primarily to reaffirm the conceptual model and refine the constructs and measures, if any, a thematic analysis methodology was adopted. As noted by Floersch, Longhofer, Kranke & Townsend (2010), thematic analysis helps identify the patterns that then a grounded theory research helps connect together. In this way, the methods are integrative and helps make the framework and themes explicated in the review of the literature more robust. Following this, a synopsis provided in Appendix-B was developed after summarizing the conversation along the themes identified at the outset.

4.2.3. Results

Except for one of the participants, there was a unanimous view that e-learning is growing within organizations. It was felt that with constant growth in the amount of required learnings, e-learning is the only cost-effective and convenient mode to train employees. There was also agreement amongst the participants that e-learnings were ineffective. The primary reasons for a lack of effectiveness identified were a lack of self-motivation and a lack of interaction and

practical experiential ability within the currently available online courses. The practitioners listed actual completion of learnings, cognition, as well as actual business output as the learning outcomes that mattered. Finally, and more importantly, there was good support for coaching and mentoring as an intervention to improve effectiveness with several practitioners identifying existing functions within organizations as offering a form of informal coaching intervention. It has to be noted here that at least two of the participants referred to coaching or mentoring type interventions even before the relevant questions were posed to them during the interviews. I had not anticipated this at the outset, although a lack of formalization of the available support mechanisms around the e-learning within those firms does leave the effectiveness lacking and subject to the individual's motivation to learn.

4.3. Study-2: E-learning with coaching intervention experiment

Study-2 was a longitudinal field experiment conducted over a 2~3 weeks period involving e-learning with and without coaching and mentoring interventions. The primary aim of the study was to establish the impact of the coaching and mentoring intervention on an individual's motivation to learn and the learning outcomes of interest to business. Given the cost impacts of coaching interventions, a key aspect of this study was to study minimalist coaching interventions in order to establish if such micro-coaching would be sufficient to boost the learning outcomes. Here, a specific objective was also to determine if decayed (or retained) learning outcomes were also impacted as a result of the intervention. Another aim was to establish if such an intervention also indirectly enhanced an individual's

interest to do continuous learning, a business imperative in these days of bite-sized learnings and fast-outdating technologies.

4.3.1. Method

A field experiment method with a time lag design was chosen to empirically test the research hypotheses. The experiment was done in a college setting mimicking workplace practices. Although not ideal, this setting was adopted since getting extended time for experiments at a workplace setting was not feasible within available timeframes for this study. Also, this learning was part of an optional curriculum. The sample variability, age, educational background, degree of study, work experience and career aspirations (this was a required course for those seeking a position in certain financial technology roles) were all quite similar, reducing a number of potential background items that could, as discussed earlier, effect the learners' predisposition to the material.

4.3.2. Participant Selection and Sampling procedures

122 students who are completing their engineering college education were recruited for this study, after due approval was obtained from the institution management. All the students willingly accepted to participate and provided consent to this effect in the online learning platform that was leveraged to conduct the experiment. The students were not provided any compensation but were treated to a meal after completion of the full exercise.

All students were briefed in a face-to-face session that they were participating in an online blended learning study where differing levels of coaching would be provided in order to measure the impact on effectiveness in the learning process. They were informed that the self-study learning modules would be on an introduction to banking and financial services, which is very much relevant for engineering students heading to technology jobs in the service industry. The materials had been designed and developed based on standard text on banking and financial services and previously used for training of fresh-graduate hires in the tech-sector companies. Thus, the materials were considered suitable and appropriate for the experiment. There were no prerequisite subjects to be read and understood prior to taking on the course. The assigned materials had self-paced learning, video and brief activities sections and included 53 units, with a total of 93 self-test quiz items to measure understanding.

Random sampling was used to assign the students into one control and two experimental groups.

a) control group or self-learning group, which had no coaching sessions, of 52 students
b) experiment group-A or minimal coaching group, which had one or two coaching sessions, of 35 students, and
c) experimental group-B or maximal coaching group, which had three or four coaching sessions, of 35 students

The idea of dividing the experimental group into two was to primarily establish how much of coaching was indeed necessary in a self-directed e-learning context and whether an absolutely minimal number of one to two sessions were sufficient, as some authors had noted in prior research.

Two coaches/mentors were engaged to provide the coaching intervention and one assessor/reviewer, who also happened to be the author of the introductory course, was engaged to rate the students face-to-face at the end of the e-learning experiment. One coach offered two sessions to the students in both experimental group-A and group-B, while the second coach just offered two sessions to the experimental group-B. The assessor met the students for the first time and was not informed of who was in control or the experimental groups, thereby ensuring an unbiased supervisor rating of all the students. The assessor met with each student for 5-10 minutes assessing the level of knowledge as well as confidence to apply the knowledge. The coaches and assessors also provided consent for participation and they opted to being acknowledged in this dissertation in lieu of any monetary compensation.

All participants had familiarity with using computers, and they had exposure to online self-paced learning models as well as online virtual classroom sessions.

4.3.3. The experiment platforms

The experiment was conducted on a home-grown learning management system, which offered anytime anywhere access, and was specifically setup for this purpose. All the learning modules and the pre-test, post-test and final test assessments and surveys were preloaded into the platform. While the system offered self-enroll functionality, to improve coordination and to help speeding things up, all the modules and assessments/surveys were auto-enrolled as and when they were ready to be opened up. The coaching sessions for the experimental groups were also pre-arranged due to general time constraints and the fact that students had to juggle between routine course work as well as model tests being conducted at the college as a precursor to the final university examinations.

The system had a facility for the students to communicate with the designated coach or mentor (through a persistent chat function) and this feature was enabled for the students in the experimental groups. The coach/mentors were requested to respond within a 24-hour window for such queries. While it was anticipated that the students would also ask questions leveraging this function and that we could measure the number of times and total interaction time for analysis, this function went unused during the experiment.

The learning platform also had a feature to schedule and conduct virtual contact sessions, which was originally intended to be used for video-based coaching sessions. This idea was dropped, however, due to logistics challenges and the

coaches were brought onsite to the campus to conduct the coaching sessions. The coaching sessions were also conducted in small batches of 3 to 4 persons per group due to intermittent availability of students amidst their academic calendar.

Measurements on when a module was selected for learning, how many times and how much time was spent on each module and how well the participants performed in intra-module quizzes as well as end-of-module assessments were all automatically recorded in the system for performance tracking purposes. The system also measured and tracked the number of interactions with the coach and time spent with the coach or mentor prior to and during the specific coaching session at the completion of the course. However, this latter measure of coaching time was measured manually given the face-to-face model employed for the interactions.

4.3.4. Procedure

At the very beginning the students were given a demonstration of the e-learning platform and allowed a 30-minute familiarization session. After this a pre-test assessment and survey (time T_0) were conducted before the e-learning was opened up to the students. The focus of the pre-test assessment was to measure the pre-test cognition as a control variable. Given the subject of e-learning is new to the engineering students, this consisted of a general test of numerical and verbal aptitude. This assessment consisted of 30 questions to be answered in 45 minutes.

The pre-test survey consisted of the measures developed for the independent variable of motivation to learn.

The students were encouraged to continue with the self-study module whenever they had time and the experimental group students were in addition asked to feel free to reach out to the coaches when/if they have doubts or clarifications. The coaching sessions were conducted at the pre-scheduled times by the two coaches. While one coach completed the planned two sessions to all the experimental group-A and group-B students, the second coach could only conduct one additional session to the experimental group-B students. Therefore, there was only a difference of one additional coaching session between the two coached groups in the study. As noted earlier, the coaching sessions were conducted face-to-face at the campus and due to time constraints and availability of students amidst their academic sessions, these were done in smaller groups instead of one-to-one at time. As designed, the coaching sessions were kept short at 20 minutes maximum per individual or group, and it was up to the students to make the best of the session. In the sessions, the coach/mentors were advised to provide necessary guidance to the individual and create self-awareness around the purpose and benefit of the e-learning apart from clearing doubts and clarifications on the subject. The coaches, however, reported that the sessions were predominantly around clarifications on specific doubts, macro-level understanding of the business context and occasional additional explanation on queried subject matter. Since the coaching sessions were pre-scheduled the students did progress on the self-paced e-learnings before the

coaching sessions and did not require further prompting for completion of the e-learning course itself.

Once the designated e-learning course and the coaching sessions were completed, a post-test survey and a post-test assessment (time T_1) was completed on day 8. The post-test assessment measured the resultant cognition from the e-learning course on banking and financial services. The post-test survey consisted of dependent variable, perceived job performance, control variable of coachability, and the independent variable of motivation to learn, which is measured again to assess the change between pre-test and post-test values.

An additional module of 10 hours of e-learning was also made available for the students to self-enroll, after they completed the initial module and the post-test. However, due to the university examinations the students were unable to undergo this additional learning.

9 days after the e-learning and/or coaching session was completed, or on Day 17, the participants were called back for a final retained-test survey and retained-test assessment (time T_2). The outcome variables of changed motivation to learn and retained cognition, which refers to knowledge after a time decay, were measured. A face-to-face assessment in an interview format was also conducted on the same day (time T_2), for around 5-10 minutes each per student, to measure the supervisor-rated perceived job performance. The supervisor assessment focused on

the level of cognition of the subject as well as confidence in applying the subject matter. The entire experiment from the familiarisation session to the final test and assessor rating took a total of 14-15 hrs over a 2~3 week period. The coaches/mentors spent a total of 18 hours over 3 separate days at the campus coaching the students in groups of 3 to 4 each, and the assessor spent 20 hours over 2+ days for the final face-to-face rating assessments.

Of the total 122 participants, only 98 participants completed all the pre-tests, post-tests, final tests and supervisor assessment. Of this 45 were in the self-learning (no-coaching group) and 53 were in the experimental coached group with 25 in experimental-group-A and 28 in experimental-group-B. The participants were entirely from the mechanical engineering department of the two colleges and therefore an all boy sample for the exception of one girl. 30 students, amongst the coached groups, were noted as the most curious and raised several queries while the rest only listened in on the coaching sessions. 12 students did meet up with the coaches/mentors, outside of the coaching sessions, to get additional clarifications, but the time was not monitored as these were brief interactions only.

Figure 2 provides a summary of the procedures for the three groups.

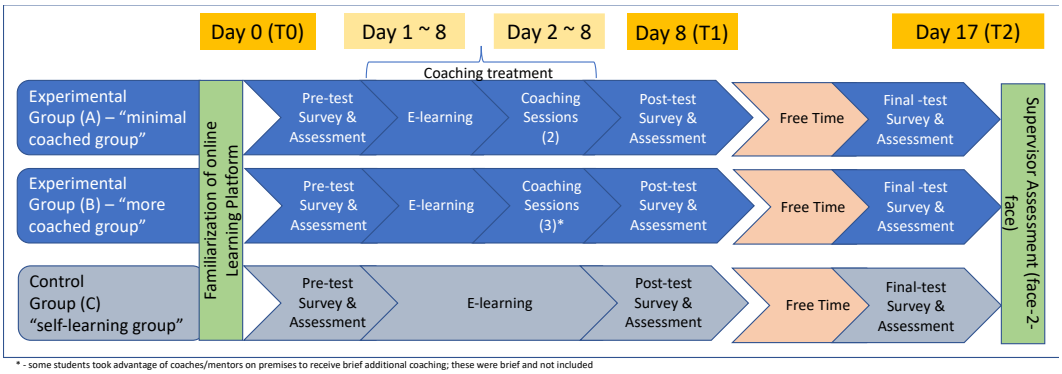

Figure 2 : Summary of experiment procedure

4.3.5. Measurements

Scale items for the variables described in this section are provided in Appendix-C and were approved by the Singapore Management University Institutional Review Board document ID: IRB-19-019-A031(319).

Dependent variables.

Cognition and Retained cognition (COG / RCOG). This was measured by the grades achieved in a specifically created assessment, which is part of the banking and financial services course the students undertook in the learning platform. The tests were conducted once in the post-test phase, right after the e-learning completion, for *cognition* values and once again during the final test phase for *retained cognition* values. The absolute grades obtained were then converted to percentages for the analysis.

Perceived Job Performance (PJPS / PJPA). This measure was operationalised using a pre-existing scale developed by Chung, Lee & Choi (2015). The self-rating was on a 2-item scale that measured for skill improvement and

confidence of applying the new skills on the job. The supervisor assessed for the same in a face-to-face interview with each of the students. While the self-assessment was done soon after the e-learning activity, the supervisor (or Assessor) ratings were measured after the time decay period. Since self-ratings were generally in the higher end of the scale, analysis was conducted with both ratings to measure for consistency.

Changed Motivation to Learn (CMTL). A new scale was developed to measure this construct of motivation to learn further, which gives an indication of the individual's intent to continue learning. This was kept as a simple 2-item scale to allow for easy interpretation. Validation of this continuous learning intention, which was going to be based on actual additional learning taken up by the student on the learning platform, was skipped as the students did not have time amidst the university exams to enrol and undertake any additional learning.

Independent variables.

Coaching Presence (CP). This was measured by the number of coaching sessions attended by each learner. Since many students opted for group coaching instead of one-on-one coaching, the coaching time in minutes was not used and this variable was set as a nominal variable with values of (1) for the control group who had no coaching sessions, (2) for the low-coached or minimally coached group that had two coaching sessions and (3) for the more coached session that had three coaching sessions. A handful of students did take the opportunity of coaches being

on premises to go for additional clarification/coaching sessions but these were brief and few, and hence this additional data was not factored into the analysis.

Motivation to Learn (MTL). This is a composite variable measuring the intrinsic and environmental-driven individual variables that determine learning outcomes. Scales from several existing studies for the seven sub-dimensions were therefore reviewed and adapted for an initial 21-item composite scale. After the initial scale was developed, a verification of the scale was done with three e-learning experts amongst the semi-structured interview participants and a pilot test was also conducted with five students at the college who were familiar with e-learning. Accordingly the measurement was then adjusted to the 18-item scale and used for the study. The variable was measured both at pre-test and post-test for analysis purposes.

Control variables.

Pre-cognition (cognitive or general mental ability) (PRECOG). This was measured by a standard test of numerical and verbal aptitude used for engineer recruitment into tech sector. This was assessed to measure possible effect on the cognitive performance in the e-learning.

Coachability (CC). An existing scale by Ciuchta, Letwin, Stevenson, McMahon & Huvaj (2018) was modified to measure the coachability index of the

students. While not a primary focus, this variable was measured mainly to test for possible effects on the primary dependent and independent variables of this study.

4.3.6. Analysis and Results

The statistical analysis was done with the SPSS package (v 25). The data were analysed primarily through simple linear and multiple regression analysis with the participants being categorized into three different groups based on the coaching presence variable. The three groups were consisting of (1) those who received no coaching, (2) those who received two sessions with a group coach and (3) those who received three sessions with a group coach. These groups are referred to hereinafter as Group 1, or the no-coaching group, Group 2, or the minimal-coaching group and Group 3, or the more-coaching group. Since all the students were not present at all the assessment points of the experiment, the data records were initially cleansed and only 98 records were deemed useful, where data for the pre-test, post-test, final-test and the supervisor assessment data was all consistently available for analysis.

Descriptive Statistics

Table 2 below provides the mean and standard deviation for the variables of measure shown split across the three groups of no-coaching, minimal-coaching and more-coaching. It can be observed that the means for all the self-rated measures are at the higher end of the scale, as is typical of character and personal inventory scales where social desirability and conformity to cultural norms drive responses

(Cloninger, Svrakic, Przybeck, 1993). Of specific note is the large difference in means between the self-rated and assessor-rated perceived job performance values (PJPS and PJPA). Both these rating are measuring the same values of knowledge and confidence level after the e-learning experiment. While there is a large difference seen, this is consistent with the literature and it should also be noted that the means are directionally consistent across the three groups overall.

	No-coached Group 1 (N = 45)				Minimal-Coached Group 2 (N=25)				More-Coached Group 3 (N=28)			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
Pre-MTL	5.30	1.05	-0.73	-0.63	5.58	1.07	-1.20	1.27	5.95	0.61	-0.41	0.05
Post-MTL	5.45	1.10	-0.84	0.48	5.37	0.85	-0.81	1.06	5.88	0.61	-0.63	1.61
Pre-Cognition	0.39	0.13	0.67	-0.40	0.40	0.11	-0.86	0.56	0.40	0.11	-0.09	0.10
Cognition	0.40	0.13	0.26	-0.72	0.44	0.11	0.35	-0.67	0.44	0.11	-0.01	-0.97
Retained Cog	0.34	0.09	1.34	3.96	0.43	0.11	-0.24	0.26	0.54	0.09	-0.23	-0.46
PJP-Self	5.49	1.21	-1.16	1.79	5.36	1.32	-1.30	0.79	6.13	0.69	-0.62	0.54
PJP-Assessor	2.93	1.48	0.80	0.03	3.32	1.39	0.26	-0.50	3.85	1.59	-0.12	-0.49
Changed MTL	5.26	1.17	-0.86	1.43	5.70	1.38	-2.13	5.59	5.79	1.09	-2.43	8.37
Coachability	5.51	1.08	-0.80	0.20	5.38	0.98	-0.67	-0.68	6.00	0.98	-1.74	3.65

Table 2 : Descriptive statistics - field experiment variables

Reliability statistics

As mentioned earlier, the scales used in the experiment were briefly tested for face and content validity with some of the e-learning exponents during the semi-structured interview stages as well as through a pilot test. Reliability for each construct was then examined using a Cronbach's Alpha test. Motivation to learn (α = 0.936) and Coachability (α = 0.795) both had values above the threshold level of 0.700, and therefore confirmed to be internally consistent. For the two item scales of the study, correlation coefficients were calculated and found to be all significant at $p < 0.01$ level. Table 3 below provides a summary of the reliability statistics.

>= 3 Item Scales	Items	Cronbach Alpha	Pre-test Value	< 3 item Scales	Items	Correlation Coefficient	Sig level
MTL	18	0.936	0.916	**PJP-Selfrated**	2	0.560**	0.01
CC	3	0.795	-	**PJP-Assessor Rated**	2	0.862**	0.01
				CMTL	2	0.640**	0.01

Table 3 : Reliability statistics - field experiment variables

Comparing Precognition across the groups

As noted earlier on in the literature review section, precognition, or an individual's general mental ability, is known to influence the learning outcome of cognition, which is being tested in this study. Since a random sampling was used to split the students into the three groups, the data was visually inspected and an independent samples test was done to compare the data across the three groups. There was no significant differences between no-coached group 1 (M=0.386, SD=0.13) and minimal-coached group 2 (M=0.398, SD=0.11); t (2,70) = 0.383, p > 0.1), between no-coached group 1 and more-coached group 3 (M=0.40, SD=0.11); t (2,73) = -.554, p > 0.1) as well as between minimal-coached group 2 and more-coached group 3 (t(2,53)=-.152, p >0.1). The Figure 3 below depicts the histogram of the data across the three groups.

Hypothesis Testing

After analysing the data collected, all the study hypotheses were tested, the results of which are tabulated in Table 4 below.

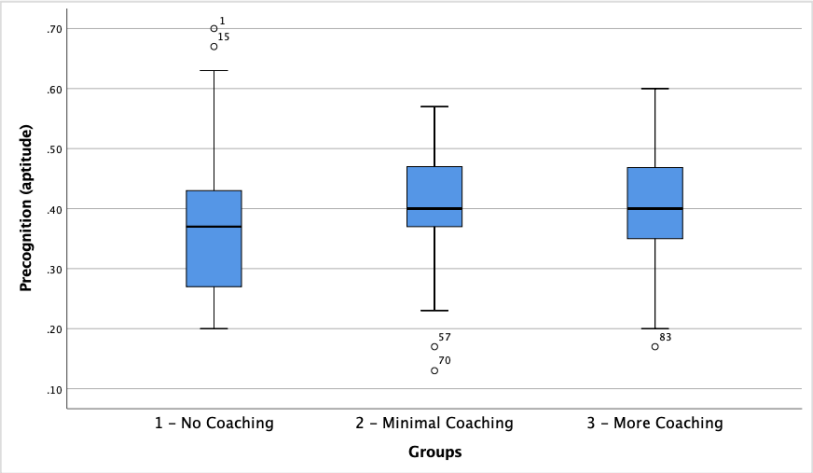

Figure 3 : Histogram distribution of Precognition across groups

4.3.7. Coaching and Motivation to Learn (Hypothesis 1)

This hypothesis explored the effect of coaching and mentoring on an individual's motivation to learn, where it was hypothesized that exposure to coaching would positively impact the learners' motivation to learn. For this, I first investigated if post-test motivation to learn varied across the three conditions of no-coaching (group 1), minimal-coaching (group 2) and more-coaching (group 2).

There was no significant difference observed in the "post-test motivation to learn" means between group 1 (M=5.45,SD=1.10) and group 2 (M=5.368,SD=0.85); t(2,70) =0.33, p > 0.1 as well as between group 1 and group 3 (M=5.88, SD=0.61407); t(2,73)=-1.891, p > 0.05. While, there was a significant difference in the motivation to learn between group 2 and group 3 (t(2,53)=-2.542, p < 0.05), it could not be shown overall that there was a significant difference between the levels of motivation in the three groups (F(2,97)=2.553, p > 0.05). The

significance level was 0.083, which was marginally greater than the 5% level of significance.

Relationships		Model	Anova				Support	Minimal Coaching Vs No Coach		More Coaching Vs No coach	
Within the workplace e-learning context :		R2	F	Sig.	Df	p	(p < 0.5)	t	p	t	p
H1	Presence of coach leads to higher motivation to learn	0.031	2.55		95	0.083	NO	-0.361	0.719	1.939	***0.055***
H2	Higher motivation to learn leads to higher cognition	0.08	8.37		97	***0.01***	YES				
H3	Higher motivation to learn leads to higher *retained* cognition	0.045	4.54		97	***0.04***	YES				
H4	Presence of a coach leads to higher cognition	0.1	1.49		95	0.23	NO	1.533	0.129	1.3	0.197
H5	Presence of a coach leads to higher *retained* cognition	0.425	36.90		95	***0.00***	YES	3.807	***0.000***	8.564	***0.000***
H6	Higher motivation to learn leads to higher perceived job performance - self-rated	0.403	64.81		97	***0.00***	YES				
H7	Higher motivation to learn leads to higher perceived job performance - *Assessor rated*	0.061	6.26		97	***0.01***	YES				
H8	Presence of coach leads to higher perceived job performance - self rated	0.056	3.89		95	***0.02***	YES	-0.455	0.657	2.394	***0.019***
H9	Presence of coach leads to higher perceived job performance - *Assessor rated*	0.045	3.30		95	***0.04***	YES	1.057	0.293	2.568	**0.012**
H10	Higher learning outcomes (of cognition and perceived job performance - selfrated) leads to higher changed motivation to learn.										
	Cognition to changed-motivation to learn	0.075	3.86	***0.03***	95	0.79	NO				
	Perceived job performance to changed-motivation to learn					***0.01***	YES				
H11	Presence of coach improves Changed-motivation-to-learn	0.021	2.02		95	0.14	NO	1.47	0.145	1.815	***0.073***
H12	Presence of coach intreacts and enhances the relationship between Motivation-to-learn and the learning outcomes										
	Motivation to learn and cognition	0.12	2.41		92	***0.04***	YES	1.75	***0.08***	1.01	0.32
	Motivation to learn and perceived job performance	0.43	13.88		92	***0.00***	YES	0.11	0.91	1.69	***0.09***
H13	Additional Analysis : Coachability and Study variables										
	with Pre-post Motivation to Learn difference	0.103	12.09		96	***0.001***	YES				
	with cognition and retained cognition difference	-0.01	0.06		96	0.806	NO				
	with Perceived Job Performance (Assessor)	0.055	6.677		96	***0.01***	YES				

Table 4 : Hypothesis testing results summary

Additionally, when testing the level of motivation before and after coaching none of the three groups demonstrated a significant difference in their level of motivation. The three groups reported a difference of ($t(1,45) = -1.035$, $p > 0.1$), ($t(1,25)=1.147$, $p > 0.1$) and ($t(1,28)=.595$, $p > 0.1$) for groups 1, 2 and 3 respectively. The results, therefore, did not show support for meaningful change in any of the cells. It was primarily pre-test motivation to learn, which was significantly correlated to post-test motivation to learn ($r = 0.582$, $p < 0.01$), that caused most of the variance ($F(4,98)=44.330$, $p < 0.001$), while coaching and mentoring had no significant impact on motivation level changes ($F(4,98)=1.195$, $p > 0.1$). Figure 4 provides a comparison of the pre and post means for motivation to learn.

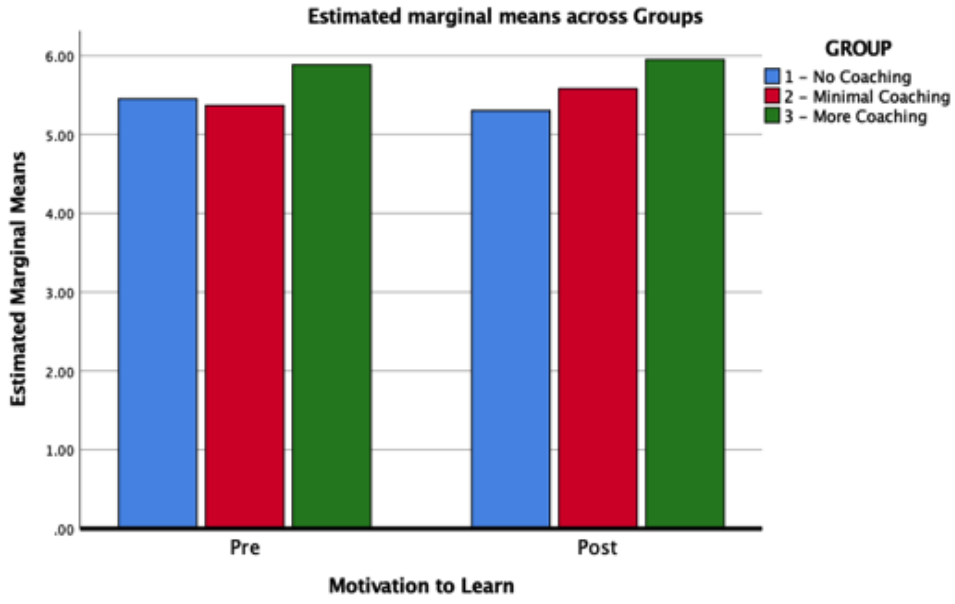

Figure 4 : Pre and Post Motivation to learn comparison chart

Two things should be noted here. Firstly, the experiment did not factor in any specific measure for the change in motivation that could be caused by exposure to the e-learning materials and the interactions therein as this was assumed to be evenly influencing all the three groups. Second, the initial mean levels of motivation in all three cells were quite high to begin with and there could have been a ceiling effect encountered. Overall, there was no support for coaching specifically affecting motivation to learn (H1).

4.3.8. Coaching, Motivation to learn and cognitive learning outcomes (hypothesis 2 ~ 5)

Hypothesis 2 and 3 tested for the effects of motivation to learn on the learning performance outcomes of cognition, grades from training assessment immediately after the e-learning (time T1) and retained cognition, or knowledge assessment done after a time decay (time T2). More than immediate cognition, *retained* cognition outcomes are critical for business, as retention primarily determines the transfer of skills to the job (Baldwin and Ford,1988; Velada et al., 2007). It was hypothesized that a higher motivation to learn will lead to higher cognition, and more importantly, higher retained cognition. There was strong support for motivation to learn to affect cognition ($F(1,98)=8.37$, $p < 0.01$) as well as retained cognition ($F(1,98)=4.54$, $p < 0.05$). Both cognition and retained cognition scores were also highly correlated ($r = 0.333$, $p < 0.001$).

Hypothesis 4 and 5 tested for the effect of coaching presence on cognition and retained cognition. It was hypothesized that presence of a coach will be positive on cognition and more importantly positive on retained cognition as well, but that the relationship will be non-monotonic in nature i.e., while the minimal coaching group 2 will have a bigger effect over the no coaching group 1, the more coaching group 3 will have a lesser effect increase over the minimal coaching group 2. It was found, however, that across the entire population coaching did not have a significant effect on cognition ($F(3,98)=1.49$, $p > 0.1$) although there was a significant impact on retained cognition ($F(3,98)=36.9$, $p < 0.001$). Figure 5 shows a comparison of the cognition and retained cognition means across the three groups.

Testing for the time decay in cognition (or difference between retained cognition and cognition across the three groups), there was no significant difference found between non-coached group 1 ($M=-0.553$, $SD=0.138$) and minimal coached group 2 ($M=-0.012$, $SD=0.118$; $t(2,70)=-1.332$, $p > 0.1$), but there was significant difference between non-coached group 1 and more coached group 3 ($M=0.103$, $SD=0.085$; $t(2,73)=-5.438$, $p < 0.001$) as well as between minimal-coached group 2 and more coached group 3 ($t(2,53)=-4.078$, $p < 0.001$). Retained cognition was found much higher in the case of more-coached group. This demonstrates that coaching intervention could have an impact on the longer-term learning performance of training. Thus, while there was no support for H4, there was strong support for H5. There was also no specific support for the relationship to be non-monotonic as hypothesized. It should be noted, however, that some of this effect

could also be due to interaction effects between coaching and motivation to learn, which are discussed a little later on in this section.

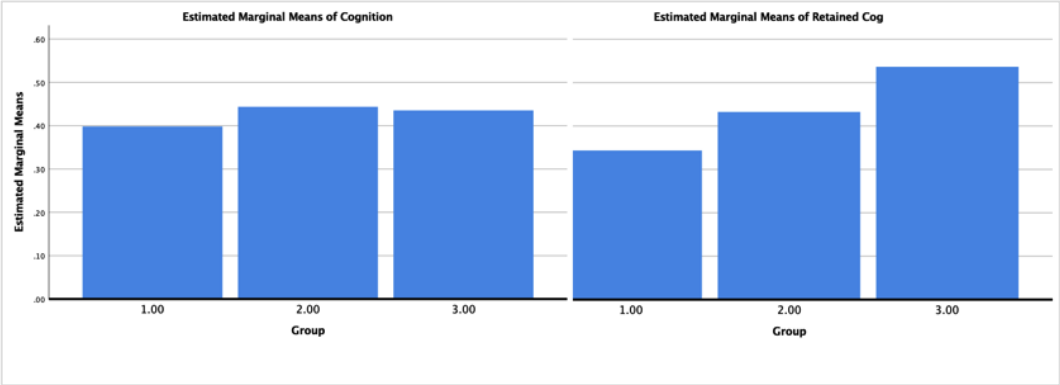

Figure 5 : Cognition and Retained Cognition means across groups

4.3.9. Coaching, Motivation to learn and Behavioural learning outcomes (hypothesis 6 ~ 9)

Hypothesis 6 and 7 tested for the effects of motivation to learn on perceived job performance, which is a measure of the behavioural outcomes of the learning activity. In this study, this was measured both as a self-rating and an assessor rating, assessed by an expert in a face-to-face session. Consistent with literature, the self-rating means (M=5.64, SD=1.16) was much higher compared to the assessor-rated mean (M=3.29, SD=1.53). A paired samples analysis demonstrated that there were significant differences across all the three groups. The groups reported a difference of ($t(1,45)=8.54$, $p < 0.001$); ($t(1,25)=7.35$, $p < 0.001$); ($t(1,28)=7.596$, $p<0.001$) across the groups 1, 2 and 3 respectively.

Motivation to learn had a significant impact on both the self-rated perceived job performance ($F(1,98)=64.81$, $p < 0.001$) and the assessor-rated perceived job performance ($F(1,98)=6.26$, $p < 0.01$). This was consistent with my hypothesis that motivation to learn is positively correlated with perceived job performance and therefore helps improve training transfer at the workplace. So there was support for H6 and H7.

Hypothesis 8 and 9 examined the effect of coaching interventions on the perceived job performance measures. Again, both the self-rating ($F(3,98)=3.30$, $p < 0.05$) and the assessor-ratings ($F(3,98)=3.89$, $p < 0.05$) consistently showed that coaching was also positively related to the perceived job performance. This also means that coaching interventions enhance the training transfer from workplace e-learning to the actual workplace.

I then compared the groups against each other to see what were the between group differences. In the case of self-ratings, there was no significant difference between non-coached group 1 ($M=5.49$, $SD=1.21$) and minimal-coached group 2 ($M=5.36$, $SD=1.32$; $t(2,70)=0.398$, $p > 0.1$). However, between non-coached group 1 and more coached group 3 ($M=6.13$, $SD=0.69$; $t(2,73)=-2.51$, $p < 0.01$) as well as between minimal-coached group 2 and more coached group 3 ($t(2,53)=-2.70$, $p < 0.01$) there were significant differences reported.

In the case of assessor-ratings, non-coached group 1(M=2.93, SD=1.48) and minimal-coached group 2 (M=3.32, SD=1.39); (t(2,70)=-1.086, p > 0.1), as well as minimal-coached group 2 and more-coached group 3 (M=3.85, SD=1.59); (t(2,53)=-1.28, p > 0.1) did not show any significant difference. However, there was a significant difference seen between the non-coached group 1, and the more-coached group 3 (t(2,73)=-2.51, p < 0.01). Figure 6 below shows the differences across the two ratings for each of the groups.

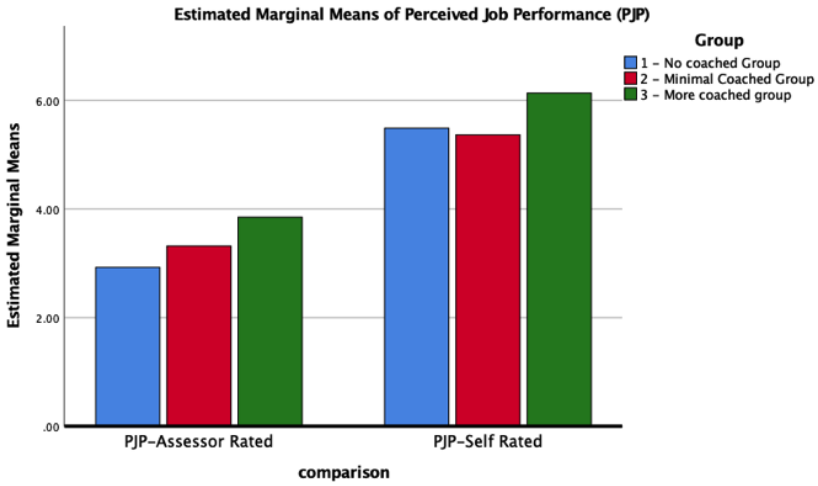

Figure 6 : Comparison across self and Supervisor Rated Perceived Job Performance

While there were slight differences between the observations for self-ratings and the supervisor-ratings, overall this indicated that as the coaching increases there is also a subsequent improvement in the perceived job performance ratings. Further, those who have been coached, do have higher behavioural outcomes, which could be beneficial for practitioners to tap on and drive more learning performance in the organizations. However, since there was no difference between the non-coached

group 1 and the minimal-coached group 2 it is difficult to determine if there was any impact due to differing levels of coaching on the perceived job performance. Overall, I could get support for H8 and H9.

4.3.10. Coaching, Motivation to learn and Continuous learning (hypothesis 10 ~ 11)

Within workplace contexts, continuous learning is a state when an individual is motivated to continue taking up and completing further e-learning courses based on prior learning success and other self-development related interventions. Hypothesis 10 and 11 explored the effects of an individual's prior learning success, and the presence of a coach on the changed motivation to learn, a measure of the individual's intent to continue the learning journey.

There was evidence overall that better performance in both cognitive and behavioural outcomes of a learning activity is positively related to changed motivation to learn ($F(3,98)=3.86$, $p < 0.05$). This gives evidence for prior success leading to further e-learning intent amongst the learners. However, it was not the cognitive outcome ($t(3,98)=0.27$, $p > 0.1$) but self-rated perceived job performance ($t(3,98)=2.56$, $p < 0.01$) which did bulk of the prediction. The self-rated perceived job performance, and not the assessor rated job performance, was used in this test this as an individual's intent to learn further would normally be driven by the individual's self-efficacy and motivation, which is more accurately reflected in the

self-rated performance assessment (Lane & Herriot, 1990). So there was support for H10.

Checking on the presence of coach, there was no support for this impacting the changed motivation to learn ($F(3,98)=2.016$, $p > 0.1$). Comparing the means between the 3 groups, I observed that between non-coached group 1 ($M=5.26$, $SD=1.17$) and minimal-coached group 2 ($M=5.70$, $SD=1.38$); ($t(2,70)=-1.42$, $p > 0.1$) as well as between minimal-coached group 2 and the more coached group 3 ($M=5.79$, $SD=1.09$); ($t(2,53)=-0.25$, $p > 0.81$) there were no significant differences reported. However, between non-coached group 1 and more-coached group 3 ($t(2,73)=-1.92$, $p < 0.1$) there was partial support at the $p < 0.10$ level. The significance level of 0.06 was only marginally higher than the 5% level of significance. One point to note is that the means for both minimal-coached and more-coached groups were both high and with a large standard deviation. There could have been a ceiling effect encountered in this measure as well. While there is no support for H11, with the strong support for H10, I conclude that coaching intervention, and an increased motivation to learn could create a scenario where learner's enjoy success and this could in turn create a motivation in individuals to learn further. However, this needs further investigation.

4.3.11. Interaction Effects of Coaching and motivation to learn (Hypothesis 12)

Hypothesis 12 explored the relationship between presence of a coach and an individual's motivation to learn. Consistent with literature (Jones et al., 2016), it was hypothesized that presence of a coach moderates the positive relationship between motivation to learn and the learning effectiveness outcomes of cognition and perceived job performance. It was further hypothesized that this relationship could be non-monotonic since increased presence of coaching may have a resistance effect (McGee and Reis, 2012) and therefore minimal coaching over no coaching may have an enhanced effect compared to more-coaching over no-coaching.

As predicted there was an interaction effect on both the cognitive outcomes ($F(6,98)=2.41$, $p < 0.05$) and the behavioural outcomes ($F(6,98)=13.88$, $p < 0.001$) with the effect on behavioural outcomes being more pronounced. It was further observed that, at the 10% level of significance, minimal coaching over no coaching had a higher impact in case of cognition ($t(6,98)=1.75$, $p < 0.1$), while more coaching over no coaching had a higher impact in case of perceived job performance ($t(6,98)=1.69$, $p < 0.1$). There is no specific evidence overall for minimal coaching over no coaching to be any better or worse of compared to more coaching over no coaching. Overall there was support for H12.

4.3.12. Additional analysis : Effect of Coachability

Coachability is a person's awareness and openness to self-development and within the learning context, the trait that allows an individual to accept feedback and learn through social interaction (Ciuchta et al., 2018; Hunt and Weintraub, 2011). Additional analyses were done with the coachability data collected to see how this was correlated with the key variables of motivation to learn, cognition and perceived job performance. Since coaching intervention was hypothesized to impact these study variables, assessing impact of coachability on the same could help to understand possible additional reasons for variances, if any.

These additional analyses with coachability were therefore executed with the change in levels of motivation, change in levels of cognition, and the assessor rated perceived job performance. The assessor rated perceived job performance was taken as it was the more objective measure amongst the two job performance ratings. The change in motivation and cognition levels were calculated by taking the difference between the post-test, and the pre-test measures.

Coachability was found to be significantly related to the motivational level difference ($F(2,98)=12.09$, $p < 0.001$) as well as the assessor-rated perceived job performance ($F(2,98)=6.68$, $p < 0.05$). However, coachability was not found to have significant correlation with the cognition difference ($F(2,98)=0.06$, $p > 0.1$). One reason for this could be the fact that presence of coach also did not have a significant relationship with cognition. While coachability was not a primary focus

variable within the study, the positive relationship demonstrated between coachability and the learning-related attitudinal variables of this study do call for this construct to be included in the coaching and training integration studies in the future.

5. Discussion

The results of this study suggest the benefits of combining micro-coaching and workplace e-learning. While the main effect of coaching intervention on an individual's motivation to learn (H1) was not supported, the interaction effects of coaching intervention on the relationship between motivation to learn and the learning outcomes were found significant (H12). This section explicates the findings from the two studies covered in this research.

5.1. Workplace e-learning is still a nascent but growing field

From the first study, which was a set of semi-structured interviews with practitioner leaders responsible for e-learning initiatives in their respective organizations, it's understood that the e-learning effectiveness problems are real issues that industry leaders are grappling with and that the state of the industry is still nascent. This was concluded from responses such as "We would like for e-learning take up rates and completion rates to improve", "We resort to classroom and labs to impart "depth of skill" training" and "There is a tendency for people to be lost in the web of plenty and this leads to under-utilisation of the facilities provided". There was a concern that "unless coordinated and facilitated, e-learnings are typically discontinued" except when these are mandatory or otherwise made part of the performance appraisal discussions. This is "despite the need to continuously skill up in order to keep oneself relevant to the organization".

Almost all interviewees echoed the need for cost-effective initiatives to improve effectiveness. This was gathered from comments like “We do not have the funds to build level-2 e-learnings that would make the learnings deeper and more effective for business”, “e-learnings need to be coordinated and facilitated and subject matter experts should be involved to provide clarifications and depth of skill” and “improve self-motivation and empower the individual to understand that skilling up is an individual’s responsibility”. There was support from all for micro-coaching interventions as a feasible approach to improve effectiveness. As soon as the micro-coaching intervention approach was mentioned, an interviewee linked this to the “workgroups and chat channels that provide support for our project teams” and suggested that such support groups could do the role of micro-coaching for learners in the coaching intervention context. Another interviewee suggested that “the e-learning tools could have a call or chat button and this could be linked to the subject matter experts to provide the clarifications from within the e-learning context as and when needed. This would ensure that the e-learnings are not paused or discontinued from a lack of understanding”. One of the interviewees, who is a learning and development leader within the organization, felt that “the future ready workforce needs a bouquet of generic and personalised learnings and that coaching may help provide that personalisation”.

5.2. Micro-coaching intervention benefits

The second study was a field experiment as one of the key objectives of this dissertation was to address the lack of empirical research within the workplace e-

learning field. A total of 12 hypotheses were tested to understand the effects of differing levels of coaching on the learning outcomes. An additional set of analyses were also done to assess impact of coachability on the key study variables. Specific impact of differing levels of coaching are explicated more in detail in this section.

As hypothesized, significant effects were seen in both cognitive and behavioural outcomes across the three intervention groups of a) those who had no coaching, b) those who had minimal coaching (total of 2 sessions) and c) those who had more coaching (total of 3 sessions) during the e-learning experiment. Consistent with the training literature (Colquitt et al., 2000; Rentroia-Bonito & Jorge, 2004), motivation to learn, which was the only independent variable of the study other than coaching presence, was significantly related to cognition (H2), retained cognition (H3), self-rated perceived job performance (H6) and assessor-rated perceived job performance (H7). Coaching presence was also significantly correlated with retained cognition (H5), self-rated perceived job performance (H8) and assessor-rated perceived job performance (H9). Learning success [1] also correlated with an individual's intent to learn further (H10) which also provides support for the higher learning effectiveness achieved through coaching. This would possibly lead to continuous learning, a key priority for organizations and individuals in today's competitive business world. Finally, presence of a coach was a significant moderator of the relationship between motivation to learn and the learning outcomes (H12).

[1] Perceived job performance levels, more than cognition levels, were the main determinants of continuous learning intentions. This is discussed in more detail later on in this section.

Support was not found for H1, which tested for the effect of coaching intervention on an individual's motivation to learn. A possible explanation for this could be that the pre-test motivations to learn were high, therefore limiting the ability of the test to have an impact. Another possible explanation would be that the 18- item motivation-to-learn scale was too long, leading to the test subjects providing socially desirable rather than conscientious inputs. The similarly high mean and SD values observed for both pre-test values (M=5.55, SD=0.98) and post-test values (M=5.55, SD=0.94) would support this explanation. By contrast the changed-motivation-to-learn, which was developed as a different 2-item scale to measure an individual's motivation to learn further based on prior learning success had a larger variation in the responses (M=5.53, SD=1.22).

H1 results further revealed that the more coaching group compared to no coaching group displayed stronger tendencies of positively affecting motivation to learn at the 10% level of significance ($t(3,98)=1.94$, $p < 0.1$). This could mean that more coaching sessions may be needed in the experiment before meaningful observations on impact to motivation could be reported. While one of the aims of the experiment was to test for differing levels of coaching, due to various limitations, only 2 (for the minimal coached group) or 3 (for the more coached group) sessions were held with an average of 15-20 minutes and 3-4 students each per session. Therefore, both scale items and coaching interventions could be redesigned in future studies to better understand the effect tested by H1.

H4, which tested for effect of coaching presence on cognitive outcomes, did not see significant support in this research. This was contrary to literature and surprising since (a) coaching presence had a significant relationship with the retained cognition, and (b) the pre-scheduled coaching sessions also focused on scaffolding support by the coach on new topics and clarifications related to the subject matter. However, this could be partly explained from the fact that the cognition test immediately after the training (time T_1) tested both concept understanding and application while the retained test done after a time decay (time T_2) focused on ensuring the concept understandings are intact. It is likely that the coached groups also did not complete the full e-learning course content and therefore did not fare well in the concept application assessments. Further, the coaching sessions, which were mostly driven by student requests for clarifications, could also have focused more on the concept understanding portions of the content. This partially explains why the more coached group had significantly higher retained test scores followed by the minimal coached group, while the non-coached group did not fare well. Figure 7 illustrates the effect with a comparison of the short-term cognition and long-term retained cognition scores. This provides insights into how a better designed scope and methodology for coaching interventions could help the short-term and longer-term improvements to learning outcomes.

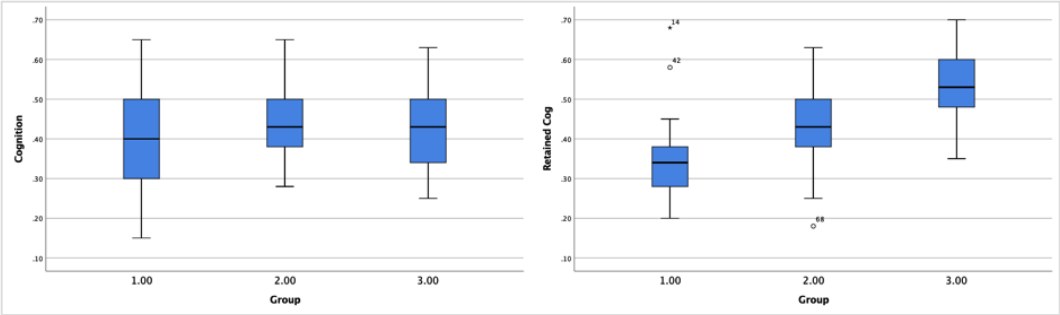

Figure 7 : Cognition and Retained cognition scores across groups

It should be noted that even with retained cognition (H5), the more coached group performed well compared to the minimal coached groups. This means that the hypothesis that the relationship between coaching and learning outcomes is of a non-monotonic nature is not supported. Further testing with additional coaching sessions may be needed to gain better insights.

H11, which tested for the effect of coaching presence on motivation to learn further was not supported. However, in this case, the more coaching over no coaching group had a significant impact at the 10% level of significance ($t(2,73)=-1.92$, $p < 0.1$), which points to a need for further investigation with additional coaching sessions. From H10, it was shown that higher self-rated job performance, rather than cognition, was significantly related with changed-motivation-to-learn. Therefore, coaching intervention leading to better self-rated job performance, could still be influencing the motivation to learn further. However, to get a better understanding future studies are needed with additional e-learning components included as part of a longitudinal experiment to better examine true continuous learning intent.

Coachability was not included in this study' model as the focus was primarily to observe the effect of coaching interventions on learning outcomes. However, additional analyses conducted in this research have shown that coachability is related to the two attitudinal variables examined, motivation to learn and perceived job performance. Future studies into coaching interventions, could include coachability into the main model of study.

5.3. Limitations of the study

Firstly, the time-lag study was conducted in a college setting as the project did not have the time required to conduct a more-ideal quasi-experiment within a workplace setting. This setting was sub-par from a few aspects. For one, the non-coached control group of students also had follow-ups to complete their e-learnings and appear for the final assessments. This could have inadvertently affected their motivation scores and therefore subdued the overall results. Further, this meant that all the students did undergo, and complete, the requisite e-learning and the assessments. As a result, the experiment did not fully reflect a work environment where most students do not enrol, nor complete e-learnings. Therefore, this limited the study from observing impacts of the brief coaching interventions on take-up and completion rates, basic learning outcomes of interest to some of the semi-structured interview practitioners.

The coaching sessions were all pre-scheduled, which was again not a true reflection of the work environment where e-learnings are expected to be done in a

self-directed manner and preference for coaching assistance would be at an individual's convenience. This possibly skewed overall motivation scores and impacted the study of any impact on individual self-regulation aspects. Further, there was only one e-learning course within the scope and no additional courses could be provided as follow-on to assess for continued learning interest amongst the students. Therefore it was impossible to triangulate the survey scores for motivation to learn further with real attempt and completion of further e-learnings in the experiment.

One of the key limitations of the experiment was related to the study of differing levels of coaching intervention. While the control group had no coaching sessions, the experiment group consisted of a) those who had a minimal of two sessions and b) those who had only one additional session or a total of 3 sessions. The variability was possibly not enough to study the impact on motivation, cognition and performance outcomes. Further, the coaching activities were done in smaller groups rather than as one-to-one partly due to preference amongst the students to do that way and partly due fact that it was less time consuming for the coaches. While this did not strictly reflect the expected workplace behaviour, group coaching did have some benefits in that it allowed for even the reticent students, who would have otherwise not taken advantage of the coaching opportunity to benefit from the sessions.

Another key limitation of the study was the high mean scores obtained in the attitudinal measures of motivation and performance behaviour, which made it difficult to make meaningful and conclusive observations. While the assessor rating of performance was able to provide the correction for the performance behaviour, conducting a longer period experiment with multiple e-learnings is probably required to properly observe the change in motivation to learn.

Other limitations of the study were that the population was mostly male, from a single culture, and a homogenous group of graduating engineering students from South India. However, there is no reason to believe that these findings could not be generalized as the primary focus of the study was to understand the effects of differing levels of coaching intervention. There is no apriori reason to believe that a population of educated individuals with prior exposure to computers and e-learning would vary significantly across genders, cultures, and continents such that the findings would be different. Nevertheless, having a better mix of gender and cultures (Renner et al., 2015) would better reflect the truly globalized workplace settings in the tech sector. As observed earlier, it would also be helpful when coachability is included as an additional factor into the study.

5.4. Contributions of Research

This study makes significant theoretical and practical contributions to the body of research on training and development, workplace e-learning and blended learning and coaching and mentoring.

5.4.1. Theoretical contributions.

The study of the effectiveness of various training methods is not new and other studies have been conducted before. However, this research represents the first attempt to integrate two key methods of training, 1) e-learning and 2) coaching and mentoring, in a field experiment for the first time. As such, this study is a unique contribution to the growing empirical literature in the field of training and development.

This also appears to be the first time the concept of micro-coaching, or short bursts of minimal coaching interventions, to improve training outcomes has been introduced to the workplace learning literature. From a grounded theory approach, the study has helped elucidate cognitive, behavioural and changed motivation as the three important micro-coaching outcomes of importance from a practitioner's standpoint.

Two key findings from the field experiment are of significance. Learning retention, which is indicative of mastery and enhances the ability to transfer knowledge to the workplace (Bechtold et al., 2018) and changed motivation to learn, which is indicative of an intent to do continuous learning are both affected through micro-coaching interventions. These two are critical business outcomes and therefore of importance to both researchers and practitioners.

While further studies are clearly required, the key findings from this study provide a foundation for researchers to expand the study of micro-coaching in conjunction with the industry demand for microlearning and multiskilling.

5.4.2. Practical contributions.

As the workplace demand for learning increases, the challenges of learning effectiveness become a priority. Micro-coaching offers a simple solution to pair with e-learning to improve overall learning effectiveness. As a minimalist blend that can be implemented with the help of internal managers and peers, this offers a cost-efficient and quick solution which can be a significant contribution to corporate practitioners.

A point to note here is that learning support workgroups or learning circles currently exist in organizations which provide informal learning support. By incorporating micro-coaching concepts and formalising these learning support workgroups within the learning ecosystem, organizations could provide both reactionary knowledge support (current function) and proactive motivational support (to nudge and follow-up), which will help to achieve better learning outcomes such as take-up and completion rates on e-learning, better learning retention, and continuous learning intent.

In such a scenario, as one of the semi-structured interviewees observed, line managers and peers in the organization could take up the role of knowledge support

while the learning and development professionals could take on the role of motivational support. Thus, micro-coaching allows for different operational models for implementation in practice and has implications for a variety of practitioners like line managers, coaches, mentors, human resource and development professionals, workplace e-learning designers and learning platform developers. In this study, however, a third party vendor was the coach, thus many of the intra-organizational motivations for attention or desire to learn may not be present.

5.4.3. Directions for future research

This section details some themes for future research in the field of micro-coaching interventions and specifically address some of the limitations with this study.

One of the outcomes of interest to practitioners is improvement of take-up and completion rates, which requires a larger population and longer study with multiple e-learnings to verify. This could be an immediate follow-on study and could help reconfirm how micro-coaching could influence self-regulation and induce continuous learning intent amongst individuals.

Adding more coaching sessions and allowing for flexible sessions through online/offline methods will enable the determination of a baseline threshold of coaching sessions required to achieve maximum learning outcomes. Such a study

would also call for a longer period and preferably would be done in a workplace or near-workplace setting so the results could then be generalised for practical use.

There is a body of research based on social networks theory that has suggested for groups of 5-7 to be created for better learning in organizations (Kozlowski and Salas, 2009; Higgins and Kram, 2001). Three of the semi-structured interviewees also mentioned things such as learning circles or support workgroups that could provide the coaching support in organizations and hence group micro-coaching and one-to-one micro-coaching approaches could be compared and contrasted in future studies.

Finally, scale issues in the motivational and other attitudinal variable should be studied further and the scales refined so that effectiveness of coaching interventions could be better measured and such interventions can be benchmarked across implementations and organizations.

Coachability, as observed from the additional analyses conducted, is a variable to be included into future research on micro-coaching. Further, as millennials form bulk of the workforce it is important to consider their learning styles and culture (Renner et al., 2015) as well into the design of future research studies.

Finally, and perhaps more importantly, methodology to implement micro-coaching within the e-learning platform contexts prevalent in the organizations should be taken up in future research.

5.5. Some thoughts on micro-coaching

Within the workplace learning context, ***micro-coaching*** is conceived as short-bursts of coaching and mentoring provided on-demand to learners by internal managers and peers. Since too much of coaching is undesirable within self-directed learning contexts, a coach or mentor should keep to minimal sessions and primarily give feedback and scaffolding upon request from the learners. Proactive interaction should only be to provide guidance on selection of learnings at the beginning and self-regulation support when learners go off track.

Learning circles or learner support workgroups within organizations, accessible via chat channels, could be leveraged for micro-coaching if they provide support when requested, have access to learning records and can nudge learners to keep progressing. Chat groups perform the same function as discussion forums within synchronous learning contexts prevalent in the academic world.

6. Conclusion

This research set out to investigate the effects of micro-coaching interventions on e-learning to improve effectiveness. It was hypothesized that short bursts of minimal coaching interventions, or micro-coaching, by internal managers and peers could address the gaps of instructional design and individual motivation and self-regulation (Bond & Seneque, 2013) to drive up learning outcomes. While, previous studies on coaching had been primarily focused on stand-alone coaching for self-development (Jones et al., 2016; Theeboom et al., 2014), this was the first time an integration of coaching and self-paced e-learning was examined.

Two studies were conducted. The first study was a series of semi-structured interviews with practitioners in the tech sector, who have experience and responsibility in e-learning implementations for their teams, which helped identify the learning outcomes of relevance and refine the inputs to the field experiment. The second study was a time-lag field experiment to measure the impact of differing levels of coaching on e-learning. Micro-coaching interventions (2 and 3 sessions for the experiment groups) were tested, and the research findings support a positive relationship with retained cognition and continuous learning, two key business-relevant learning outcomes for modern day organizations.

As observed earlier, e-learning in both the academic and workplace settings is already growing exponentially and this trend will likely not drop anytime soon. To remain competitive in a connected and globalized world, more and more

employers will continue to require employees to acquire a multitude of skills in a self-managed way and for this they will seek readily available and authentic sources of e-learning. With only limited time available to acquire new skills, employees will prefer learner-centric models allowing personalised and just-in-time learning that is ubiquitously available anytime and anywhere. For this, educators and e-learning providers will continue to leverage emerging digital technologies such as data analytics and artificial intelligence to personalise e-learnings, collaborative technologies to enable social and crowd learning models, and mobile, augmented and virtual reality technologies to facilitate just-in-time and on-the-job learning (Dron & Anderson, 2016).

However, the effectiveness challenges of employees taking up and completing their learnings as well as fully achieving the requisite outcomes will remain in the future. For one, learning motivation in itself is not something that can be fully controlled by technology. Secondly, while introduction of every new technology will help bridge the effectiveness gap, technological hardening of the learning process to improve effectiveness would directly contradict with the personalised and learner-centric demands of the individual. Further, digital technology introductions will also come at a higher cost of building, maintenance and delivery. In addition, as employees use multiple learning sources, the learning records and performance of individuals will also get spread across a multitude of platforms, which makes it difficult for organizations to identify people with the right skills when needed.

Within this context, studying micro-coaching integration with e-learning has potential for practitioners and researchers alike. As demonstrated in this study, this minimalist face-to-face interaction introduces a human element to the e-learning process and indicated a positive impact on the business-relevant learning outcomes of retained cognition and intention for continuous learning. However, several questions remain. Do learners really take-up and complete more e-learning courses when there is such coaching support? What is the optimal number and duration of coaching sessions? Is there a negative impact when there is more coaching? What should be the remit of micro-coaches, so learning remains a self-managed process? Can internal learning support workgroups and learning and development teams operate as micro-coaches? What are the benefits of leveraging internal managers and peers instead of external coaches as micro-coaches and does this boost employee motivation to learn more? Future training researchers and e-learning designers should consider these questions carefully and examine all aspects of micro-coaching integration with e-learning.

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Appendix-A: Semi-Structured Interview Questions

The following 5 questions were used to open and lead the discussion. Several follow-up questions were also asked during the interview discussion.

1. Is e-learning a medium of training in your organization?
    a) Why?
    b) Are there other modes of training offered to your employees?
    c) Over time which modes of training would grow the most?
2. Has e-learning been effective for your firm?
    a) Does e-learning achieve the expected outcomes in preparing your employees in the face of changing demand for new skills and knowledge?
3. What are the strengths of e-learning, if any?
4. What are the shortcomings, if any, in your opinion?
    a) If so, why these exist?
    b) What are they?
    c) How do you address these?
5. What, if any, has your organization tried to improve e-learning effectiveness and what has been the results?

Below questions, which are specific to the nature of the intervention in this research, were discussed after the initial inputs from the participants so as not to pre-meditate the course of discussion.

6. How involved are your managers/peers in talent development?

- Do you see their involvement as a key to improving learning effectiveness?

7. Has coaching and mentoring been used to help employees enhance their learning?
    - If not, what would your opinion be on the usefulness of such a method?

Appendix-B: Synopses from Semi-structure Interviews

1. *Participant-1 (PAR1: Head of Shared Services, global tech consulting services)*

E-learning as a medium. As a talent-based organization, e-learning is a big medium to address the virtual nature of our global workforce. E-learning is usually referring to online interactive learnings, self-paced and typically fit-for-purpose and bite-sized rather than facilitated classroom learnings and labs or workshops. Recently, we are encountering more interactivity, gamification, augmented reality aspects being incorporated into e-learnings and therefore the expectation is that this medium will continue to grow going forward.

Current state of e-learning effectiveness. E-learning is effective where interaction is less and there is a need for mandatory learning of processes and procedures. We see that the awareness and education aspects are well achieved through e-learning. The ability to apply knowledge when a situation demands, however, is not being achieved currently and thus labs and workshops are still being conducted in facilitated classroom environment where the objective is clearly to achieve depth of skill. While we would ideally expect that e-learning outcomes are not only to learn concepts but also successfully apply the same on the job, current e-learnings are still deficient in certain interaction elements and this is one reason they are still not as effective as expected.

What makes e-learning more effective. Learning is an interactive process, and an ongoing interaction loop of feedback through on-the-job or interaction with teams and experts is key to reinforce and enhance this knowledge. So more than the e-learning platform alone, the strategy around how this learning event is incorporated into an individual's learning and the organizational support provided will be a key to enhance the learning results. For example, creating a support group that provides review and feedback will help further knowledge outcomes. Another aspect that affects effectiveness today is user motivation and prioritization, and therefore coordinated and facilitated e-learning with help of study groups helps to ensure that learnings are completed and not discontinued. Finally learning circles where subject matter experts (manager or peers) are also part of helps to address the clarification and depth of skill needed to achieve overall learning outcomes.

Support for coaching and mentoring interventions. As interaction and feedback are key aspects of a learning process, such interventions will help. In our organization, the learning circles loosely perform a role of coaching and mentoring for those who want to acquire, and master certain emerging skill sets and there is certainly a room to do more here.

2. *Participant-2 (PAR2: head of Application management, Retail bank with APAC operations)*

e-learning as a medium. In my organization, e-learning is not a big option and trainings are predominantly done in a classroom, workshop, or lab format. However,

employees do have access to public e-learning and do on occasion take this up for acquiring new skills required to complete their jobs.

Current state of e-learning effectiveness. One of the reasons for not focusing on e-learning is due to its effectiveness concerns. For people in the support functions, you should have practical knowledge, and this function does not easily lend itself to e-learning. E-learning is not very engaging like in classrooms and combined with no practice it is therefore not offering a longer-term benefit to individuals. I would admit though that e-learning is good at offering re-usability and convenience benefit, which are important considerations from a learner's viewpoint.

What makes e-learning more effective. For e-learning to work, interaction and feedback elements of the classrooms and practical elements from workshops have to be incorporated such that the training time can be short and yet the outcome is effective. The current static e-learnings does not really offer such facilities and hence do not suit the needs.

Support for coaching and mentoring interventions. If these interventions can suitably provide for interaction and practical knowledge impartation, then these would be beneficial, although unless these are tried out for real it is difficult to know. Further, the practical learning which can occur at workshops and labs are still no replicable in such e-learnings and therefore it is still suspect if there could be real benefits obtainable.

3. *Participant-3 (PAR3: Head of Learning and Development, Global Bank Captive - Operations)*

E-learning as a medium. e-learning or tech-based learning, which refers to online and interactive learning, is a large initiative for us, and we buy a lot of off-the-shelf contents from global vendors in both technical and non-technical or soft-skills domain for this purpose. For example, in the operations space where process improvements and automation using the emergent robotic process automation is a huge need of the hour, our workforce leverages e-learning to understand the new techniques and technologies literally on the go. In the technology space, many new programming languages and several new platforms and innovations are being introduced practically every other day and there is a constant struggle to understand what this means and how the organization can leverage the same. Here again, e-learning helps to quickly train and re-skill the workforce and adapt to these new introductions. Finally, e-learning is certainly increasingly adopted for all mandatory learning and these are typically 45min to 60 min courses, which all employees are required to complete. However, e-learning is simply an enabler, and we also provide immersion in innovation labs, project-based assignments and instructor-led touch training. A mix of both medium is used within the organization.

Current state of e-learning effectiveness. E-learning is generally targeted on the entry level workforce. More than 80% of the current workforce are millennials born between 1980 and 2000. They prefer learning which is more interactive and tend to

very easily pick up and learn things on their own. Off-the-shelf tech-based learning as well as video-based learning, which are already at a level of sophistication enabling complete self-paced learning, is made available aplenty and is very popular amongst this segment. However, there is a tendency to get lost in this 'web of plenty' and there is a need to mentor and guide these learners to choose and benefit appropriately from these learning resources.

What would make e-learning more effective. There is no one size fits all method and the learning and development teams in organizations need to recognize that learning offerings should be customized and tuned to the individual's kick or interest in learning. The future ready workforce cannot be serviced with top-down learning models, but a set of both generic and bouquet learnings should be offered to each individual. As e-learnings become more and more interactive, learners would be their own teachers and continue to prefer learning individually. Managers have to ensure the talent is ready for the future and should hold each individual accountable for acquiring the right skills and the right knowledge. Both managers and the learning and development teams should empower employees to grow more effective in their jobs by helping them navigate, prioritize and leverage the multitude of learning support available.

Support for coaching and mentoring interventions. Today everyone has access to this large amount of learnings both within and outside of the firm and it is key

that there is help and guidance to choose learnings that fit one's work goals and also one's learning styles in order to become more effective.

4. *Participant-4 (PAR4: COO, Insurance Major covering operations, technology and sales agency)*

E-learning as a medium. Talking specifically from the standpoint of product training to our sales force, e-learning, or digital learning, exists but the expansion is slow given the challenges in gauging the effectiveness of basic e-learning. E-learning with gamification or contextual and game-based training improves effectiveness but are costly to build and deploy.

Current state of e-learning effectiveness. As such humans are psychologically more inclined to image-based rather than text-based and therefore e-learning with varying levels of interactivity helps improve the understanding. Multiple progressive levels and ability to jump levels are particularly important as one-size-fits-all gamification will put off learners who already have a level of knowledge as is typical in any workforce. Take the example of pension products training. Level 1 could be about the basic product description which a novice would go through whereas Level 2 could be on what specific products are being sold and the product details which persons with general knowledge of pension insurance would directly jump into. Level 2 training are usually company specific and not available off-the-shelf. Insurance companies are still grappling with investments to create such rich e-learnings, which in turn affects the overall e-learning effectiveness.

One larger challenge though is that current measures such as testing for cognitive levels at the end of e-learnings address only 20% of business outcomes whereas the real business value measures for the enterprise are things like higher new business premiums for sales personnel or more satisfied calls or higher resolution rates in case of customer service center agents. There are no easy means of measuring holistic impact to the enterprise from the e-learnings and trainings in general. Consistent, incremental and demonstrable measurements in a stage-wise basis, if feasible, could make e-learnings a truly effective model.

What would make e-learning more effective. In the absence of rich-interactions, it is required to conduct multiple iterations of e-learnings followed by on-field work and then bite-sized role-plays over weekends for knowledge to be properly imparted. For this trainers as well as managers or subject matter experts who have written the e-learning materials are engaged. It is the interaction, guidance and feedback from the managers that provide the on-the-job learning benefits in this case.

An ‘interventionist training program’ where, say, a learner undergoing an e-learning could dial a helpline and can get context sensitive help from an expert in that particular subject will also boost current e-learning effectiveness. Taking the same pension product sales training example where a novice is going through the training, this calls for an online chat facility where a pension product sales expert

can be contacted to clarify short doubts while the learner is still undergoing the e-learning. By providing the knowledge just-in-time it takes less time from the subject expert as well as keep the learner motivated to complete the course within the stipulated time. Further, such models could be cost-effective and quick compared to enhancing e-learning with role-play interactivity where it is still uncertain if all scenarios and all sorts of doubts can be anticipated and incorporated.

Support for coaching and mentoring interventions. Interventionist method of training is typically a model where a specialist guides someone to undergo a learning and therefore similar to the concept of coaching or mentoring. By being provided at the time of need and being point-focused this would be crisp and could lead the learner to go on to explore more and learn better. Having a subject matter expert doing this is key as the focus should be on informal learning that would prepare the learner for actual taking the knowledge to the field.

5. *Participant-5 (PAR5: Country Head, Global markets technology at Bank Technology captive)*

E-learning as a medium. E-learning is one of the forms of trainings offered while other forms of classroom sessions, trainings from within the department such as expert speak sessions, brown bag sessions are all offered. There is always a mix of offerings and each employee typically picks a combination each year. Mandatory trainings are almost always e-learnings as this is the most effective form for compliance trainings. However, with internal training teams slimmed down in favor

of external training coordinators there is increasingly more dependency on online learning resources.

Current state of e-learning effectiveness. E-learnings are typically provided from a variety of external sources such as LinkedIn, Safari books and others. These are almost always ineffective. Part of the reason is that when there is no top-down focus, as in the case of mandatory trainings, this does not work. When there is no tracking, completion and reward for e-learnings the only reason an employee would complete a learning is due to self-motivation and this typically happens in only about 10-15% of the workforce. There are some takers for industry-recognized certification courses that would look good in one's resume and be a feather in the cap come annual appraisal season. However, when this is not the case, the e-learnings are almost always ignored and therefore in my view large sums of money spent on external e-learnings go wasted or underutilized.

What makes e-learning more effective. Before we get into this, it is important to understand what causes the underutilization of the e-learnings. One of the primary reasons is delivery pressure from projects or other production issues that takes away any little time set aside for the e-learning. As such there is only so much of effort available in a 24-hour day and today's world has also brought in a lot of digital distractions in one's life. In addition, the rate of change of technology is much higher today than a decade ago and skills go outdated so quickly putting pressure on employees to keep abreast with new learnings. Programming languages that

lasted a whole decade do not even last a full 3-year cycle these days. However, the sheer volume and variety of things to learn itself confuses and intimidates a learner at times. Finally, as organizations become more engineering-centric they require more practitioners-managers, and this requires theory learning as well in addition to being able to code. For example, kubernetes or docker containerization technologies require both understanding of principles as well as practice to execute correctly. The learners though look to online learning resources when stuck and therefore not acquire the right level of depth. This need for instant gratification instead of structured learning does introduce an element of ineffectiveness into the time spent on learning.

In terms of solutions, firstly, if there are cultural issues of apathy towards self-improvement then these have to be addressed by the relevant managers. If there is a genuine lack of time available and specific learnings are needed to be acquired to do a new job or project, then appropriate time off should be provided to the learners, so they can acquire the skills needed to switch roles. Finally, there should be a cycle of learn-do-learn for people to acquire both understanding and ability to apply knowledge.

Further, management information systems or MIS, from the online learning systems is needed to track, monitor, and nudge the employees to benefit from the investment. Information such as who all have used up the quota, courses completed

and how much of time spent on the courses will help managers have the right conversations and improve effectiveness.

Support for coaching and mentoring interventions. For all new technologies support workgroups, chat channels and mail distribution lists exist that learners can use in conjunction with the online resources to get insights and depth to improve their skills. This is similar to the concept of coaching and mentoring interventions to achieve effectiveness of e-learnings. Clear explanation of concepts, and a discussion with the subject matter usually does stick in memory and is very much needed in the creation of practitioner-managers.

6. Participant-6 (PAR6: Head of Production Services, Global Bank Technology)

e-learning as a medium. Provisioning and use of e-learning depends a lot on the subject matter as some learnings lend itself easy to e-learning or computer-based training (cbt) while others do not. For example, policy training, which is typically mandatory training, lends itself easily to e-learning and very effective at that as well. Most of the technical and technology stuff have moved to video-based training. Currently trainings from external commercial sources are being made available to employees. YouTube as well as several do-it-yourself learnings are also available for individuals to learn from. In this mode, since large volumes of training can be offered at a fraction of the cost, the overall outcome is largely positive even though this is not considered a substitute to face-to-face training.

Current state of e-learning effectiveness. Outside of the mandatory trainings, even though large amounts of external trainings are offered, dropout rates are high mostly due to personal discipline rather than deficiencies in course quality. The world is very different today and only self-motivated individuals take up continuous self-development as a priority. Face-to-face trainings are increasingly more difficult for companies to offer and even 1 or 2 per year is considered a luxury. This means it is important for the individuals to make the best of the e-learnings and skill themselves up to take the next role or project. Anyone who does not take these up seriously are frankly not the type who should be employed by the organization.

What makes e-learning more effective. Outside of the mandatory trainings, there is certainly challenges but since the alternative options for imparting knowledge are not available, people have to put in the efforts and leverage e-learning effectively. As such take up and completion rates of online courses are key, and management should factor into account those who have taken this up when considering stretch objectives or candidates for promotions and change of roles. For example, cloud technology is an emerging area now and I would like to look at what courses an individual has undergone in the space as a demonstration of skills and self-motivation before inducting members into new project teams. Understanding interest levels and nudging as well as including such learning objectives into one's annual performance management objectives would also be necessary and critical. However, I still feel that persons who require constant feedback to complete their learning objectives do not fit into an organization that is performance oriented.

Support for coaching and mentoring interventions. Typically, when people are stuck, asking people around oneself and/or contacting relevant subject matter experts helps to get the relevant inputs and make progress. This is very much facilitated by the company through various internal collaboration tools such as chat and face-to-face video calling. In that sense, introduction of micro-coaching will indeed be a good initiative.

Appendix-C: E-learning with coaching experiment scales

C.1. Motivation to Learn (MTL) scale

This composite 21-item list measures the intrinsic as well as environmental-driven motivation of an individual to pursue learning at the workplace. The items were selected from existing literature and validated through initial user sessions, following which the 3 additional items towards the end of the list were excluded. All the sub-measures are self-rated using 7-point Likert scale (where 1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree or disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree).

Sub-measure	Shortened list of Items	Scale Reference
X-2a. LGO (Expectancy)	Both Pre-test and Post-test: • I prefer to work on tasks that force me to learn new things • The opportunity to learn new things is important to me • I would like to extend the range of my abilities	Adapted from: Button et al. (1996)
X-2b. PU (Value)	Pre-test: • I believe undergoing learning activities will be useful in my job • If I undertake learning it will help me accomplish my work tasks faster • Spending effort to learn new skills will help me perform better Post-test: • I understand that learning activities are useful for my job	Adapted from: Davis (1989)

	• I understand that learning will help me do my job faster • I understand that acquiring new skills will help me perform better	
X-2c. LC (Affect)	Pre-test: • I believe in my capabilities to acquire requisite skills for my job • I believe that I can learn through online learning • I feel confident in using new skills in my job Post-test: • I believe I can learn the skills required for my job • I can acquire skills via online learning • I feel confident of using the new skills in my job	Adapted from: Bandura (1977)
X-2d. SR (Cognitive and Metacognitive)	Pre-test: • I am able to manage my time to allocate effort towards e-learning courses • I am likely to complete all modules of an online learning course Post-test: • I was able to manage my time and undertake e-learning courses • I was able to complete all modules of the online learning	Adapted from: Bandura (1991)
X-2e. LS (Resource)	Pre-test: • I am open to seeking help from my colleagues in order to achieve my learning objectives • I am able to manage my progress and make adjustments to complete my learnings Post-test:	Adapted from: Warr et al. (1999)

	• I sought help during the e-learning to achieve my learning objectives • I managed my time well in order to complete my learnings	
X-2f. IP	Pre-test: • Interaction during my e-learning helps me to achieve the learning outcomes • Feedback is important for me during my learning Post-test: • Interaction during my learning, helped me to achieve the learning outcomes • Feedback during my learning is important to me	Adapted from: Ladyshewsky, (2013)
X-2g. PLS	Both Pre-test and Post-test: • My institution believes in the importance of training and development • My colleagues help me when I have a problem during my learnings • My colleagues appreciate me when I perform well in my learnings	Adapted from: Facteau, Dobbins, Russel, Ladd & Kudisch, 1995
Additional items	Pre-test: • Using e-learning would make it easier to do my job (X-2b) • I can find time to undergo e-learning courses (X-2d) • Timeliness of feedback is important to me (X-2f) Post-test: • I understand learning would make it easier to do my job (X-2b)	(belonging to above sub-measures)

	• I was able to find time to undergo the e-learning course (X-2d) • Timeliness of feedback is important to me (X-2f)	

C.2. Coachability (CC) scale

This is a self-rated measure of the extent to which an individual is open to being coached or mentored by others. The items are self-rated using 7-point Likert scale (where 1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree or disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree).

X-3. Coachability	• When I do not understand, I seek help from others • I appreciate feedback during my learning process • I am genuinely committed to learning and improving my skills	Adapted from: Ciuchta et al. (2018)

C.3. Perceived Job Performance (PJP-S) – self-rating scale

This is self-rated measure of perceived job performance covering both the knowledge level and the confidence level of the specific knowledge. The items are self-rated using 7-point Likert scale (where 1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree or disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree).

Y2 PJP-A (self rated)	• After completing the course, I feel more confident of applying knowledge from my e-learnings on the job • After taking the course, I believe my skill level has improved	Adapted from: Chung et al. (2015)

C.4. Perceived Job Performance (PJP-A) – assessor-rating scale

This is assessor rated measure of perceived job performance covering both the knowledge level and the confidence level of the specific knowledge. The rating is done basis actual interaction with the student on the subject matter. The above items are measured using 7-point Likert scale (where 1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree or disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree).

Y-2 PJP-A (Assessor rated)	• After completing the course, student seems confident of applying knowledge from e-learnings on the job • After taking the course, student has better cognition of the subject	Adapted from: Chung et al. (2015)

C.5. Changed-Motivation-to-Learn (C-MTL)

Changed-Motivation-to-Learn is a self-rated measure of continued motivation to learn further as a result of prior better learning performance. The items are self-rated using 7-point Likert scale (where 1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree or disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree).

Sub-measure	Shortened list of Items	Scale Reference
Addl. item	• I believe I did well in this e-learning course • I would be interested in taking another e-learning course in this area in the future	None